This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

THE LIBRARY OF CONGRESS

This One
E01F-CTJ-NQS5

THE LIBRARY OF CONGRESS

THE

QUARTERLY

JOURNAL OF AGRICULTURE.

VOL. XI.

JUNE 1840—MARCH 1841.

WILLIAM BLACKWOOD AND SONS, EDINBURGH,
AND 22 PALL MALL, LONDON.
MDCCCXLI.

S3
J8

PRINTED BY NEILL & CO., OLD FISHMARKET, EDINBURGH.

CONTENTS.

I. On a new Method of Feeding Sheep on Turnips. By James Stuart Menteath, Esq. younger of Closeburn . . Page 1

II. On the Use of Gaseous Substances to Vegetation. By Cuthbert W. Johnson, Esq., Corresponding Member of the Maryland Horticultural Society, ... 32

III. On Insects most Injurious to Vegetables and Animals, and the means best calculated to counteract their Ravages. No. VII. By James Duncan, M.W.S. 50

IV. On Clay or Plug Draining, ... 68

V. On the Cost of Stocking a Small Farm. By William Murray, Sliock, Aberdeenshire, ... 76

VI. The Agriculturist's Note-Book.—No. XI., ... 81

1. Remarks on Dr Ratier's Method of Making Coffee, 81.—2. Consideration of Moorband-Pan, 86.—3. Preserving Potatoes; by Mr Robert Lymburn, nurseryman, Kilmarnock, 90.—4. On Acclimating Cattle; by Dr James Smith, Louisiana, 92.—5. Extirpation of Ferns; by Mr James Caird, Craigcaffie, by Stranraer, 94.—6. Inefficient and Cruel Method of Sweeping Chimneys, 95.—7. Causes of Destruction by Fire, 99.—8. The Different Breeds of Sheep; by Mr William Hogg, Shepherd, 105.—9. The Feeding and Dressing of Tups; by Mr William Hogg, Shepherd, 108.—10. Wire Turnip Baskets; by Mr G. Buist, Bombay, 112.—11. Hurdles for Feeding Sheep on Flower-Garden and Pleasure-Grounds; by Mr G. Buist, Bombay, 113.—12. Rain-Proof Sheep-Feeding Troughs; by Mr G. Buist, Bombay, . . 114

VII. Miscellaneous Notices, ... 116

1. Cottage Windows; by James Stuart Menteath, Esq., 116.—2. On Preserving Wood with Lime, 117.—3. The Consumption of

Opium in China, 120.—4. Gentlemen Whips, 121.—5. Waste of Coals, 121.—6. Sellers of Matches in London, 122.—7. Supply of Water for London, 122.—8. Tithe Commission—Hops, 122.—9. Cure for Slug, 124.—10. New Method of Tanning, 124.—11. Important Turnpike Decision, 124.—12. Woollen and Glass Cloths, 125.—13. A Cause of "Sturdy" in Sheep, 125.—14. Starch from Sago, 126.—15. Wooden Under-drains, 126.—16. Destructive Effect of New Wheat on Sheep, 127.—17. Sir W. Burnet's Process for the Prevention of Dry Rot, 127.—18. French and English Agriculture, 127.—19. Diseases in Sheep, 128.—20. Lockerbie Sheep Show, 128.—21. Potatoes Raised from Cuttings, 130.—22. New Breed of Sheep, 129.—23. The Plantagenets, 130.—24. Ginseng, 130.—25. Gaudin's Light, . 131

VIII. Quarterly Agricultural Report:—The Weather—The Crops—Feeding of Ewes—Corn Markets—Corn-Law Agitation—Central Society of London for the Protection of Agriculture, . . 131

IX. Tables of the Prices of Grain, the Revenue, &c., . . 137

X. Fiars Prices of the Counties of Scotland for the Year and Crop 1839, ... 139

XI. On rendering Manures more Portable and Applicable by the Drill. By Cuthbert W. Johnson, Esq. Corresponding Member of the Maryland Horticultural Society, ... 141

XII. Agriculture of Hindostan.—No. V. (Conclusion.) On the Culture of Silk, ... 163

XIII. On the Adulteration of Bone-Dust. By Mr James Halkett, New Scone, Perthshire, ... 177

XIV. On the Agriculture of the County of Cork.—Part III. (Continued from vol. x. p. 528), ... 182

XV. Thoughts on the Improvement of Seed-Wheat. By Mr John Russell, Beanston, East Lothian, ... 210

XVI. On the Effects produced by the Chemical Nature of the Soil and Subsoil upon Cultivated Crops. By Henry R. Madden, Esq. M. D., Penicuik, ... 214

XVII. On the Canker in the Larch. By Mr Alexander Drummond, Surveyor, Perth, ... 221

XVIII. On the Relation subsisting between Population and Subsistence, ... 226

The Principles of Population, and their connection with Human Happiness. By Archibald Alison, F.R.S.E., Advocate. 2 vols. 8vo, ... 226

XIX. The Agriculturist's Note-Book, No. XII. . . . 238

1. Beet-root (*Beta vulgaris*), 238.—2. Dogs, Food for, and Rational Treatment of, 239.—3. Cream-Gauge, or Cream-Glass,

245.—4. A peculiar Mode of raising Turnips. By Mr James Main, Chelsea, 247.—5. Swedish Mortar-Plaster Cart. By Peter Möller, Esq. of Laholm and Skottorp, Sweden, 248.—6. Winning the Second Crop of Clover. By Mr Bell of Hunthill, 249.—7. Which is the most Profitable, Horse or Manual Labour? 252.—8. Introduction of Merinos into Scotland, 254.—9. The Ægilops changing into Wheat, 256.—10. Relation existing betwixt the Shape of Animals and the number of their Pulsations and Inspirations, 257.—11. Remarks on Mr Blacklock's Treatise on Sheep. By Mr William Hogg, Stobohope, 258.—12. Fiars and Average Prices of Wheat for the last eight years. By Mr Bell of Hunthill, ... 263

XX. Miscellaneous Notices, ... 264

1. Sheep, and their propensity to Fatten, 264.—2. Cure of the Scab in Sheep, 266.—3. Rohan Potato, 266.—4. Vegetative Power of the Sea-Sand in Morecambe Bay, 267.—5. Culture of the Carrot, 268.—6. Preservation of Timber, 269.—7. Solar Influence, 270.—8. Sowing Wheat after being Kiln-Dried, 270.—9. Parsley, 271

XXI. Quarterly Agricultural Report—Weather—Crops—Society for the Protection of Agriculture—Show of the Royal English Agricultural Society at Cambridge in 1840, ... 271

XXII. Tables of the Prices of Grain, Butcher-Meat, and Revenue, &c. 275

XXIII. On the Advantages of a Government Grant for Emigration from the Highlands and Islands of Scotland. By Mr Alexander Macgregor, Licentiate of the Church of Scotland, Manse of Kilmuir, Skye, 277

XXIV. A Sketch of the Agriculture of Fifeshire. By Mr George Buist, Bombay, ... 298

XXV. On Shelter. By Mr D. Bain, Edinburgh, ... 320

XXVI. On Artificial Hatching, ... 330

XXVII. Jethro Tull and his Husbandry. By Cuthbert W. Johnson, Esq. Corresponding Member of the Maryland Horticultural Society, 342

XXVIII. On Insects most injurious to Vegetables and Animals, and the means best calculated to counteract their ravages.—No. VIII. The wheat-fly—Oat-grub. By James Duncan, M.W.S. . . 362

XXIX. On Canker in Larch, Peach, and Apple Trees. By Mr John Pearson, Gardener and Planter to W. L. Childe, Esq. of Kinlet, near Bewdley, ... 379

XXX. On the Four-Course System of Husbandry, with hints on its Advantages and Defects. By Mr Matthew Marmaduke Milburn, Thorpfield, Thirsk, ... 384

XXXI. On the State of the Poor, and on a Legal Provision for them, 393

The Principles of Population, and their connection with Human Happiness. By Archibald Alison, F.R.S.E., Advocate. 2 vols. 8vo, ... 393

XXXII. An Account of the Meeting of the Highland and Agricultural Society of Scotland at Aberdeen in October 1840, . . 410

XXXIII. The Agriculturist's Note-Book.—No. XIII., . . 428

Potato Failure; by Mr James Falconer, Balnakettle, Kincardineshire, 428.—Destruction of Sparrows, 432.—Draining of Fens, 434

XXXIV. Quarterly Agricultural Report—Crops—Importation of Foreign Wheat—Epidemic among Cattle and Sheep, . . . 435

XXXV. Tables of the Prices of Grain, Butcher-Meat, Wool, the Revenue, &c., ... 438

XXXVI. The Iron Trade, chiefly as connected with Scotland. By the Rev. William Patrick, Hamilton, ... 441

XXXVII. On the importance of Agriculture, and the best means of promoting and recording its improvement. By Mr John Hannam, North Deighton, Yorkshire, ... 456

XXXVIII. Sir Anthony Fitzherbert's "Boke of Husbandrye," and the early English Farmers. By Cuthbert William Johnson, Esq., Corresponding Member of the Maryland Horticultural Society, 474

XXXIX. The Agriculturist's Note-Book.—No. XIV., . 498

1. Restraining Sand-drift, 498.—2. Reclaiming Bogs, 501.—3. Natural History of Bees, 504.—4. Natural History of Dogs, 511.—5. Apple-Gathering, 516.—6. Mr Towers on the Rotation of Crops, 519.—7. Mr Sang on the Scots Fir, 530.—8. Working of the English New Poor-Law, 534.

XL. Tenth Annual Report of the Proceedings of the Glenkens Society for improving the condition of the Working Classes. By William Grierson, Secretary of the Society, ... 541

XLI. Defence of the Corn Laws, . . . 597

Being the third and concluding Notice on the "Treatise on Population" by Archibald Alison, Esq.

XLII. Quarterly Agricultural Report—The Weather—Equalization of the Sugar Duties, ... 612

XLIII. Tables of the Revenue, of Prices of Grain, &c., . 614

THE

QUARTERLY

JOURNAL OF AGRICULTURE.

ON A NEW METHOD OF FEEDING SHEEP ON TURNIPS.

By James Stuart Menteath, Esq., younger of Closeburn.

> "No person ever deserved better of a country than he who first cultivated turnips in the field. No plant is better fitted for the climate of Britain,—no plant prospers better in the coldest part of it,—and no plant contributes more to fertility. In a word, there has not, for two centuries, been introduced into Britain a more valuable improvement."—*Lord Kames's Gentleman Farmer.*

Of all the domestic animals of our island, sheep are of the greatest importance to the farmer and the community. Sheep can be reared in situations where scarce any other animal can subsist. In their fleeces they supply a valuable article, which, by its manufacture in the woollen trade, gives employment and a living to thousands, and thus contributes, in no small degree, to the productive labour, the commercial prosperity, and the opulence of every country, in which these animals are bred on a large scale. Sheep husbandry, being so very valuable a branch of rural economy, well deserves the utmost attention of the farmer, who derives no small part of his profits from it. Though much has been done to improve the breed of sheep in Scotland, and to supply them with better food at all periods of the year, much yet remains to perfect the feeding of these animals when folded on turnips; and as every exertion is now making in our northern part of the island to render land more productive by drainage and subsoil ploughing, why should we be left behind other parts of the kingdom in making every proper effort to fatten our sheep in the shortest space of time, at the least possible waste of food, and in supplying greater quantities of butchers' meat, now so necessary at all times of the year for the sustenance of a population, whose numbers are yearly on the increase ?* Great progress has been made in all branches of farming, but no department has undergone greater improvement than the feeding, rearing, and general treatment of sheep. During the late war, the rapid rise in the price of all kinds of meat, and the stimulus also given by numerous Agricultural Societies,—and, above all others, the Highland and Agricultural Society of Scotland, instituted to spread useful information and excite inquiry,—added to the example of many public-spirited farmers, gentlemen, and noblemen, are circumstances which have contributed, perhaps, to rouse the attention of every agriculturist to place the science of feeding farm stock on the best and most economical principles. How much soever Scotland may surpass the southern parts of the island in other branches of her husbandry, in that of feeding sheep, when folded on turnips, it must be admitted she has something to learn from the eastern counties of England.

The management of sheep, when fed on these roots, is well understood in Norfolk, Lincolnshire, and the Wolds of Yorkshire. The Scotch farmer, studious of his own interest, would do well to direct his attention to this subject. The treatment of sheep in the districts just named, is not, perhaps, so generally understood as it deserves to be. We shall, therefore, offer a short description of it, hoping to see it ere long universally introduced into this country.

---

* "It may serve to afford some idea of the extraordinary increase and improvement of live stock in Scotland throughout the whole period (from 1723 up to the present time), and the extent to which the feeding process has been carried, to state, that Glasgow, in 1763, though that city had then a population of 30,000, the slaughter of cattle, for the supply of the public market, was wholly unknown. The number of sheep and oxen there required *now*, does not materially differ in proportion to the greatly increased number of its inhabitants from that furnished to the city of London. In 1831, the population of London amounted to 1,472,000; and, at an average of three years, ending with that time, 156,000 head of cattle, and 1,238,000 head of sheep, were annually sold in Smithfield market (*M'Culloch's Statistical Account*, p. 586). In the other large towns of Scotland, there is reason to believe, a demand in nearly a similar ratio exists. Such has been the extraordinary improvement in the condition and habits of the people. The whole of this supply of butchers' meat is now furnished to Scotland by her own agriculture; and, besides the large exportation of lean stock to the neighbouring kingdom, a very considerable number of fatted animals are continually being sent thither from the north, east, and south of Scotland,—an amount which has been lately much increased, from the greater facilities afforded by steam navigation."—*Journal of English Agricultural Society*, Vol. i. Part I., p. 102.

Since the introduction of turnip husbandry into Scotland, the cultivation of that valuable root has become universal. Abundance of food is thus supplied for the flocks during the winter season; greater numbers of these can be reared; and, by folding them on turnips, her poor, light, sandy, gravelly soils have been rendered fertile, and capable of yielding luxuriant grain crops. The introduction of steam navigation, also, a new era in Scottish rural economy, having brought the markets of the south within her reach, has encouraged many to cultivate more extensively the turnip crop. The demand also for fat meat being continually on the increase, it has become a profitable business to the farmer to feed as many sheep as he possibly can; and, instead of driving his flock southward in a lean state to market, the above facilities, and increased demand, have enabled him to bring them into good condition at home. Owing to all these things, a great revolution has been effected in the management of sheep. It ought, therefore, to be the aim, as it is the interest, of the Scottish proprietor to adopt in theory, and reduce to practice, whatever may enable him, in the readiest and least expensive way, to fatten his stock, and bring it into marketable condition. Towards this, he would be greatly assisted by following the method pursued by the English farmer of the eastern counties in his management of the flock.

It may be remarked, that the soil of the counties of England, where this new plan of feeding is now so generally practised, rests upon the chalk-formation. As the soil in almost every case partakes of the ingredients that compose the rock upon which it lies, in the districts of which we speak it is composed chiefly of calcareous matters,—flint mixed with vegetable mould of a sandy, loamy nature. In other parts of this chalky stratification, as in the Wolds of the East Riding of Yorkshire, we find more clay blended with the soil; and there is a subsoil in some places, of a reddish clay, verging in depth from a few inches to a foot or two, resting upon the chalk rock. This soil, made up of these constituent ingredients, naturally produces a good pasturage for sheep, though of a close, short herbage. Under a proper arable cultivation, it yields luxuriant crops of oats, barley, wheat, sainfoin, turnips, and mangel wurzel. Although this soil rarely possesses a depth of mould of more than five or six inches, it requires every twenty-four years to be top-dressed with chalk, which is raised from underneath out of deep pits, and then spread over the surface, at the expense of from £2 to £3 an acre. If this calcareous manuring be neglected, the grain crops become light and unproductive, the red clover degenerates into a worthless and dwindled plant, and the turnip failing to round and bulb, breaks out into the disease commonly known among agriculturists by the name of "*fingers and toes.*" On the other hand, this top-dressing of chalk, at the interval specified above, restores the productive virtues of the soil, and crops of all kinds are again yielded in abundance. This application of chalk to the soil affords a curious and striking instance of the necessity of dressing all soils whatever with calcareous manure. It is, for example, pursued with immense advantage in Craven, Yorkshire, which is one of the richest and oldest grazing districts in the north of England. This extensive tract is incumbent on the carboniferous or mountain limestone; and its soil must, as we may well suppose, be highly impregnated with calcareous substances. Still, however, it is found essential to make it produce the grasses in abundance and of good quality, that it be top-dressed every ten or twelve years, and that very largely, with newly burned lime. It is not unusual, we are informed, to lay on an acre as much as 300 imperial bushels of this mineral manure. Invigorated by this dressing the grasses and clovers spring up in the richest luxuriance. And if this practice be indispensable in these highly calcareous countries, how much more necessary for all other soils, which, not resting upon a substratum of chalk or of limestone, have little in their composition of those ingredients essential to the promotion of their fertility, and the full development of their strength.* In an interesting article "*On increasing the depth of soil,*" by Mr Johnson, which appeared in this Journal lately, the farmer will learn what a large quantity of lime and other earthy substances, are yearly withdrawn from his soil by all the vegetable plants he cultivates on his farm. And he will also be made aware how necessary it is, from time to time, in order to preserve the fertility of his fields, to apply, in addition to animal and vegetable manures, those of lime and other earthy minerals which the grain, grass, and root crops are every year abstracting from his land. The renovation of the soil by lime, in the method just mentioned, was not, it would appear, unknown to the Romans, while masters of our island. In the Wolds of Lincolnshire, and elsewhere in the chalk range of stratification, chalk pits of very great antiquity occur, and where is the improbability that that intelligent people, acquainted with the use of calcareous manure in agriculture, had availed themselves of the chalk to dress their tillage land in the districts where it is found? We may farther observe, that, in these light chalky soils, *bone manure* is most extensively used to raise turnips, and great improvement by this application has been effected in these soils.

---

* In the management of pasture or grass land there is much room for improvement in Scotland. It cannot be denied that we are too partial to the use of the plough, as if tillage were in every case the most profitable husbandry. Were a much larger extent of country kept permanently in pasture, were the enclosures effectively sheltered by belts of plantations and well drained, and the fields occasionally top-dressed with calcareous composts, we are confident that both landlord and tenant would find their respective interests promoted, their profits greater and also more secure. The climate of all the western parts of Scotland being humid, and saturated with moisture by frequent and copious rains, grazing and dairy husbandry would be found in very many districts to be more advantageous than tillage. It is believed, and, we might add, almost ascertained by actual experiment, that one-third more rain falls on the western side of Scotland than on the eastern. In proof of this we refer to the returns of the rain-gauge. The average quantity of rain that falls in Scotland within the year is calculated at 31 inches; that of the eastern counties being 26½; and of the western, 37. At Edinburgh, it is 23½, whilst at Glasgow, it is 29.65 inches. In the eastern counties the harvests are reaped seven days sooner than in the western, and, consequently, at less expense. Surely the western farmer should consider these facts. His fields ought to be subjected to a more thorough drainage, a greater number of them laid down in permanent pasturage, and now and then (the oftener the better) top-dressed with unstinted composts of lime, animal, and vegetable manures, that all the virtues of the soil may be brought out, and abundant vegetation produced. From the high value of dairy produce, and the increasing demand for fat meat, we are sure that a well-managed grazing system of husbandry in the western districts of Scotland would return a higher profit than that of tillage. In the treatment of grass land, it will be found very useful to pass over it every spring in the month of April, either a heavy thorn bush, or a light harrow, once or twice. Afterwards to follow this scratching with a plentiful sowing of grass seeds, mixing with them some pounds of clover, red and white, and then give it a good rolling. The seeds collected in the hay-loft will go a great way to supply a sufficient quantity for every acre of the field. When the field is a meadow, either under irrigation or not, and mowed for hay, two or three pounds of Catstail-grass or Timothy, the *Phleum pratense,* should always be sown on each acre. No hay is superior to the Timothy in luxuriance and excellence, and in acceptability to the palate of all graminivorous animals. Nature seems to point out to man the necessity of replenishing every year his grass fields with fresh seeds. When she is left alone, she plentifully prepares a succession of plants, by shedding abundantly every where seeds to replace those plants that have disappeared. Since the introduction of sheep and cattle, the stalks of various grasses being eaten, few are left to bear and ripen their seed. Mowing the field, also,

It is generally allowed, that, in the feeding of all sorts of animals, the sooner their appetite can be satisfied, the sooner will they lie down to rest. In these circumstances, an animal very soon takes on flesh, and becomes fat. The reverse happens, when a long time is taken up in satisfying the cravings of their hunger. It is, on this principle, that the practice has been introduced into the eastern counties of England, of presenting to sheep, when they are folded on turnips, these roots cut up into long, thin, narrow slices. When this is not adopted, but the animals merely turned in upon turnips, and left to do the whole work themselves, many hours, often a whole day, are consumed, before they have satisfied the demands of na-

interferes with the ripening and shedding of seeds necessary for the production of fresh plants. Thus from constant grazing and repeated mowing of the same grass field it is found in the generality of soils, yearly to become thinner of plants, and yield lighter crops of hay than it had carried in former years. Were, however, this simple management, just recommended, carried into practice, our pasture and hay fields would be annually replenished with an abundance of fresh, healthy vegetation, and consequently, would carry a greater number of stock, and yield to the scythe a heavier cut of hay. Whenever top-dressing is laid upon such fields, the same management ought to be applied to it.

ture; and thus little time remains for rest, rumination, and sleep.

The formation of the mouth of the sheep, indeed, points out to the owner of the flock the necessity of assisting the animal by artificial means to eat the turnip. Sheep, like all other ruminating animals, have eight cutting or incisor teeth in the front part of the lower jaw, but none in the upper. They have six grinding or molar teeth, on either side, both in the upper and lower jaw, making altogether the number of twenty-four. Between their front teeth and the grinders, there is a vacant space of nearly an inch and a half. It is very rare to find the newly dropped lamb with any front teeth; but when a month old, it has a complete set of front cutting teeth. The two front teeth of the under jaw drop out at the end of the year; six months after, the two next to these are shed; and at the end of five years, the teeth are all renewed. (See Blacklock's Treatise on Sheep, p. 10.) At or soon after Christmas, the two front teeth of the hogg sheep, when put on turnips, either fall out, or become so loose, as to prevent them from tearing up and masticating the root with ease. And it is believed by some, from the circumstance of these young sheep losing their broad or middle front teeth while put on turnips, that they never have them properly replaced with new ones. As winter sets in, the frost rendering the vegetable harder and more tough, particularly of such sorts as the Swede, whose firmness of texture makes them more durable, it must be evident that the young sheep, having their teeth in this defective condition, will find it no easy matter to obtain their daily meal. Hence the poor animals, in many instances, with bleeding mouths, pass the greatest part of the day painfully struggling to fill themselves; and are deprived of that wonted period for rest and rumination, so indispensable to bring them rapidly forward into condition. The owner is surprised and mortified, after having had his flock confined so many weeks, even months, to find that his hogg sheep, though abundance of good keep was supplied, are very far from being fat and fit for the butcher, and that they require, after the turnip season, to be pastured for some months on grass to make them fit for the market.

The same remark applies with no less force to the more aged sheep, particularly the old ewes, whose teeth, from various causes, are often in a decayed and defective state. It is a well known fact, that, when folded on turnips which are frozen, there is not only great danger of their falling off, but even of not being able sufficiently to satisfy their hunger. . This evil can easily be prevented by cutting down the turnips into small, narrow pieces, and presenting them in wooden troughs. The sheep can take them easily into their mouths, and manage them with their grinding teeth, which are not liable to so many accidents and diseases as the front or incisor teeth, and which do not undergo so many changes.

Besides the defective state of the teeth of young and old sheep disabling them to eat freely the turnips on the ground, Blacklock, in his able treatise on sheep (p. 145), states, that there are many varieties of sheep, incapable of feeding on turnips, owing to the form of the face, the uppermost jaw projecting considerably past the lower, hindering the chisel-shaped front teeth from being brought to bear upon the root. The sheep, having the jaw in this state, in Scotland, are called *grun-mouthed* sheep, resembling in their profile that of the pig.

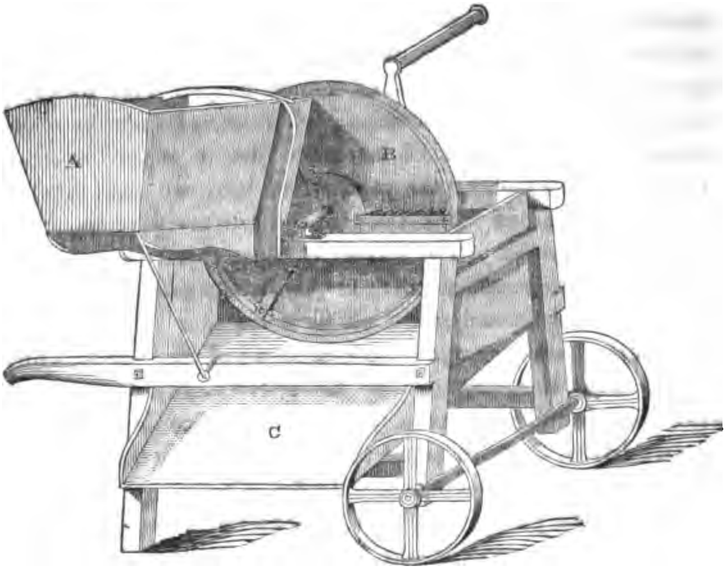
Few intelligent flock-masters can be ignorant of the waste and injury their turnips suffer from allowing their sheep, when upon them, to eat them indiscriminately on the ground. Whenever sheep are let into a turnip fold, they run over the whole ; and then eat such of the tops as they have not trampled down. Many of the turnips before they are tasted by the sheep, are liable to have their bark or rind broken by their sharp hoofs, which injury exposes the root to the wet and frost, and thereby occasions unnecessary loss. Others of the turnips are wasted by the sheep partially scooping out only a little morsel, and then leaving them to be trampled upon with great waste. Besides, when the turnips, being traversed over and trodden upon, are bespattered and befouled with urine and dung, and other filth, they must be unsavoury and disagreeable to the taste of the animal. Much complaint, in the last November Agricultural Report for East Lothian for 1839, is made of the sheep that were feeding on turnips confined by hurdles, having been injured by the rainy season, making these roots so foul and dirty. Such destruction of food in our northern climate is a serious loss to the owner. Our severe, backward, and cold spring, so trying to the flock, ought to persuade the breeder to use his utmost endeavours to preserve, by every means in his power, his turnips; and husband them by every precaution he can think of, to enable him to carry his sheep through this season of the year, when they are most pinched for sustenance, and when the ewe and lamb require succulent and nutritious diet. The farmer of those eastern counties of England already named, alive to the loss he suffers by folding his sheep in the usual way, has for some time abandoned it, and adopted another much more economical, and one by which he can bring in a shorter time his animals to market. The successful feeding of sheep, of course, greatly depends upon the quality of food presented to them; and upon the resources which the farmer possesses for supplying it during the severest seasons of the year. It cannot be effected without exact regularity in portioning it out, and strict economy in the management of the different articles on which they are to be supported.

Having thus, in a general way, stated that much remains to be done in Scotland toward the improvement of the management of sheep, and advanced a few reasons why this department of husbandry ought to engross a larger portion of the farmer's attention, we now proceed to a short description of the method pursued by the sheep farmers in the eastern counties of England.

In the first place, a turnip-cutting machine is provided. In the construction of these machines, there is great variety. We have inserted a figure of one of the most approved form, from which the nature of the turnip-cutting machine will be understood.*

---

* For the information of those of our readers who have not seen this form of turnip-cutting machine, it may be proper to give a short description of it here. A is the hopper into which the turnips intended to be sliced are put, the roots and tops of the turnips having been previously taken off. The inclination given to the bottom of the hopper keeps the turnips always close to the cutters. B is a circular disc of cast-iron, revolving on an axle and driven by a handle. It acts the double purpose of forming a plate, upon which the cutting knives are fixed, and of being a fly-wheel to maintain a steady motion. The knives are of two forms, one a long straight knife for



Some idea may be formed of the extent and estimation in which cutting turnips for sheep is held in some parts of England, when we state that Mr Crosskill, an ingenious maker of agricultural implements at Beverley, informed us that he had, within these last three years, supplied 400 turnip-cutting machines to the farmers in that part of Yorkshire,

cutting the turnips into broad slices, the others are short ones fastened into the disc at right angles to the long knife, and whose province it is to cut the broad slices into narrow strips. In the ordinary form of the disc which is cast in the same plane, it is frequently observed that the cut turnips do not freely leave the knives. To obviate this inconvenience, the portion of the disc immediately posterior to the knives is somewhat bevelled or twisted, to afford room to the strips to fall down. They thus freely fall down upon the inclined board C, slip forward upon it, and drop into the troughs on the ground. We believe it was Mr Slight who first introduced the bevelled form of the disc. The small knives can be removed, and then the machine is converted into a slicer of turnips for cattle. The two wheels give a steadiness to the machine when in use much superior to only one wheel. It may be worth mentioning that we have seen a model of a turnip cutter very similar to this one, which was made by a wright in the parish of Merton in Berwickshire fully 30 years ago,—so slow is the progress of the improvements in agriculture.—Editor.

each machine costing L.5.* To work this machine, a man and a stout lad are hired. The two are able every day to cut turnips that will suffice to feed about 300 sheep. It is the general practice to commence using these machines as early as Michaelmas; and on no account whatever to suffer the Swede turnip to be given in any other manner. Wooden troughs are also provided. Each of these is ten feet long and eight inches wide at bottom, and seven in depth. They are placed upon feet or blocks of wood five or six inches high to raise them from off the ground. The greater number of these are employed to contain the sliced turnips. But as cut hay and straw, salt, and pounded oilcake are daily allowed, some of the troughs are required for these articles. The troughs that hold the salt, oilcake, and cut hay, ought to have a cover over them to protect them from the rain and snow. Very great attention must be paid by the shepherd daily to shift, at least four or five times, the troughs from the place on which they have been standing, to other places within the field. By this attention every part of the ground will be equally well trodden upon and manured by the flock.

---

* "The economy effected by this simple machine, which costs but L.6 or L.7, has been stated to us by an authority which would at once be admitted as very high, to be no less than one-third of the whole produce. If it be taken, however, only at a fourth or fifth, why, it may be asked, has not every farm in the country been long since furnished with this cheap apparatus? If a contrivance were discovered in Manchester which should save one-fifth of the cotton consumed in a manufacture (were such a saving possible), not a year could pass before most of the old machinery would be replaced by the new, and such changes are constantly taking place there, at the expense of many thousand pounds; but the turnip is the raw material of the farmer's stock, and the farmer is of the same enterprising race with the manufacturer; why then, but on account of the separate and secluded scene of his industry, is the spread of agricultural inventions so slow, the extension of those which concern manufactures so rapid; and what, but a central connection of the cultivators of the soil, can diminish and remove the obstruction."—(Vol. i., Part 1., p. 16, *Journal of English Agricultural Society.*)

We are much indebted to Mr James Ransome, an able and intelligent maker of Agricultural Implements at Ipswich, for much information, most kindly communicated to us, respecting the management of sheep, when fed with cut turnips, as well as for informing us of the best sorts of machinery for cutting turnips. We have similar thanks to offer to Mr Crosskill of Beverley.

In the eastern counties of England the white globe turnip is not so much approved of, and less of it is grown than formerly. The more hardy and nutritive varieties are preferred, as the Swede and yellow bullock turnips differ in the quantity of nutritive matters they afford, which is in proportion to the size of the roots, or according as their texture is solid or spongy; the largest roots containing proportionally the least quantity of nutrition; the middle sized the greatest. At one of the Farmers' Club meetings at Ashbocking in November last (1839), a Norfolk white turnip was exhibited, which measured three feet and one inch in circumference. When cut open, there was only one inch and a half of firm substance within the rind, the rest being unsubstantial as a sponge, thus shewing that size is not the only excellence to be sought in the growth of these plants. The Swede or *Ruta baga* is superior to all other varieties. It is seldom injured by the frost, a matter of the greatest consideration in our climate, where the severity of the winter has, during these some years past, been most destructive of the white globe turnip. Although the Swede may be less productive in some soils in the average weight of crop than the globe white turnip, it contains more nutritive matter, being as 3 to 2, and so ought to be more extensively cultivated in Scotland.* There is scarce any light, sandy, gravelly soil, where, under proper management, it might not be raised with advantage. An extra quantity of farm-yard manure added to bones, with a few cwt. per acre of pounded rape cake, the poor soils might be made to yield fair crops of this valuable root. On the light soils of Norfolk, it is now pretty generally the practice to plough down the oat stubble, as soon as the crop is carried off the ground, and sow rye. In the spring, the sheep, particularly the ewe and lamb, are folded on the rye, as upon turnips. As soon as the sheep have gone all over the field, it is ploughed up, and prepared for sowing those roots. By this excellent management, the poor soils, being thus heavily enriched with manure, are made to carry heavy crops of turnips. Were the Scotch farmer to follow in this respect the example of the Norfolk husbandman with his light soils, he would insure abundance of succulent food for his ewes and lambs, at a time he is under such difficulty often to provide it, and he would also, by the rich manuring of his land, look with greater certainty for more abundant root and grain crops. At Holkham, in Norfolk, the Earl of Leicester, the father of English agriculture, who had last year 500 acres of turnip and mangel-wurzel on his own farm, raises, in considerable quantities, the green-top yellow turnip. He procures the seed from Mr Leslie, seedsman, Old Meldrum, Aberdeenshire. This variety, Lord Liecester sows as late as the first week of July. As this sort of turnip strikes its root deep into the ground, it is preserved from frost, and, by keeping sound to a late period of the spring, it is found a valuable means of support for the ewe and lamb. Where wheat is grown, rape is much substituted for the white-globe turnip, which being early eaten down by the sheep in the autumn, the land is ploughed, and grain is immediately sown.

---

* "It was stated, not long since, at a meeting of the English Agricultural Society in their rooms in Cavendish Square in London, by Mr Maxton, that he had grown 40 tons per acre of Swedish turnips. He mainly ascribed the increased produce to preparing his land for the turnip crop immediately after harvest, and even sometimes before the crop was removed from the fields. The advantage resulting from the mode of preparation is remarkably confirmed by an experiment upon the home-farm of Sir George Grant Suttie, Bart., at Balgone, in East Lothian, explained by Mr Scougall. He says, 'the experiments consisted simply in having a part of the field, intended for turnips, prepared in November 1838, and the whole operation completed in the same manner as if the seed had then been put into the ground.' The remainder of the field was prepared at the usual time. Upon weighing a drill of equal length in both parts of the field, it was found that the gross weight in that part which had been prepared in the autumn weighed nearly 38 tons per acre, and, when cleared of tops and roots, upwards of 34 tons per acre; whilst, on the other part, prepared in the usual manner, it realized in gross only 28 tons, and, when cleared of roots and tops, 25 tons 14 cwt. Mr Scougall observes, 'the result will speak for itself.' If the increase here stated be in reality the result of this mode of preparing the land, it will prove

to be one of the greatest improvements made of late years in cultivation. The land is admitted to be fertile, but it is a stiff soil, and, consequently, more difficult to get into a suitable condition to produce a turnip-crop than the ordinary turnip soils. Here, then, is a method, whereby the produce of soils, until lately considered to be almost incapable of producing a turnip-crop, may be made to produce one-third more weight in food, consequently, supporting animals one-third more in number, and ultimately raising a proportionably increased quantity of corn."—*Q. J. Agric.* No. 49, p. 650.

This autumnal management of stiff, heavy, clay land, intended to be in turnips the succeeding summer, is well adapted to Ayrshire, and all the tracts of Scotland, which rest upon the coal-formation

To return to the operations in the turnip-field: The white globe-turnips, as being the most perishable, are first eaten. They are pulled up, the tops and leaves removed, and are laid into heaps of from thirty to forty bushels each. These heaps are so distributed over the field, as to answer the convenience of the shepherd, who, in shifting his folds from place to place, always finds a heap or so at the spot ready to be cut by the machine for his "woolly people." As, in the early part of the season, there is little apprehension of injury from frost, it is thought a sufficient precaution to cover these heaps with their own leaves. But, at a later period, before the frost sets in with severity, the heaps, which are then collected, are secured by covering them with straw and earth. This practice is known in most of the eastern parts of England by the term of "*clamping*." Before the fold is entered by the sheep, every turnip is pulled up and removed. The wooden troughs, in number sufficient to supply every sheep, are placed at suitable distances, within the sheep-fold, which is fenced in with nets, or bats, or hurdles. The man and boy, having already cut the turnips, these small slices are thrown into the troughs, and, during the day, at different and stated intervals, they are replenished. At the same time, great care is taken to disturb, as little as possible, the sheep reposing and chewing their cud. It is of the greatest consequence in feeding every sort of animal, that set and stated times of the day be observed for giving them their food. When sheep have eaten enough, they will lie down and ruminate. On no account whatever ought they at such moments to be broken in upon and disturbed. Their improvement in condition will rapidly go on if they are left to carry on the process of digestion without any molestation.

In the troughs, as we have before stated, cut hay and straw, salt and pounded oil-cake, are placed; occasionally, as a change of diet, bruised oats or barley are given. Of the oil-cake, at the beginning of the season, half a pound in the day is considered ample allowance for each sheep; but this quantity is gradually increased to one pound. After the sheep have remained the number of days that is thought sufficient to manure and tread the soil, the fold is then shifted to another place, the turnips having been previously all taken up, and piled in heaps outside, ready to be cut by the machines.

With this brief description of the new method of feeding sheep folded on turnips, by the farmers of the county of Norfolk, Lincolnshire, and the Wolds of Yorkshire, let us now state the reasons they advance why this improvement in sheep husbandry should be adopted.

1. The first reason has already been delivered in a foregoing part of this paper, and has reference to the teeth of sheep; but as it is a matter of importance to the farmer, it may not be superfluous to repeat it. The pulling and tearing at the turnip loosens the two front cutting teeth of the hoggs and old sheep to such an extent, that they are apt to fall out, and, in many cases, actually do so. In this deficient state of the mouth, it is impossible that the younger animals can eat a hard Swede turnip, and in such a quantity as quickly to fatten and be ready for the market. Indeed, if the turnips be not cut, many of the flock can scarcely exist, and, while in the midst of plenty, may be actually starving. The teeth of the more aged sheep, again, from a variety of accidents and diseases to which they are liable, and from having been also much worn down by the hardness of many plants on which they have subsisted, are often, before they are put on the turnips, in a very imperfect condition, which necessarily prevents them from rapidly taking on fat, when folded on turnips, according to the old way. The malformation, also, in the structure of the upper jaw of some varieties of sheep, known in Scotland by the name of *grun-mouthed*, is another reason to adopt the plan of feeding sheep, when folded on turnips, with these roots cut into thin, narrow slices.

2. That the hoggs and the older sheep, when placed on turnips, will feed much quicker and be kept in a more healthy condition, when these roots are cut with machines into small, narrow slices, which they can easily take into their mouths, and which are placed before them in long wooden troughs within the fold; that they will sooner fill themselves, lie down, and ruminate. It is certain that when less time is taken up in eating, the more speedily will the animal become fat; the quicker that flesh can be laid on, the greater economy will there be of food. By treating the young sheep or hoggs in this way, at about a year old most of them may be sent from the turnip field to market fit for the butcher. This is a very great benefit to the farmer, not only enabling him to increase

the number of his sheep, but also better to prepare his fields for growing his grain crops.

3. That sheep, penned in the fold on turnips like all animals under confinement, require a variety of food in order to make them fat. The habits of the sheep, both in its wild and domestic state, require its food to be very varied. Linnæus observed that while cattle ate 276 species of plants offered to them, and refused 218; that sheep took 387 species, and rejected only 141. Magendie, a celebrated French physiologist, has shewn by experiment that it is impossible an animal in a healthy state can exist longer than six weeks on one article of diet; death often takes place even before the end of that period.* Hence the necessity of supplying the sheep, when on turnips, with a variety of articles of food. On this principle, in the part of England before named, each sheep receives in the day half a pound of bruised oilcake, and this quantity is gradually to be augmented to one pound, or even more. As much salt also is given them as they will lick, it being a useful seasoning to their food, and indispensable to the health of all graminivorous animals. Steamed potatoes might also be supplied to the feeding flock. And we are confident that, with a proportion of such steamed food daily supplied them, their fattening would be hastened. It has been found very advantageous, while the ewes are nursing their lambs, to feed them with scalded maltcombs, giving about one sack to every hundred of them.† Cut hay is mixed with the scalded maltcombs. In those seasons, when turnips are a deficient crop, this diet is found a good substitute for the roots. These maltcombs thus prepared with other artificial food brings on very fast those sheep that are put up to fatten. Cut hay and straw are liberally furnished them in the troughs. These last articles of food are held to be so indispensable for the animal's health that they must always be supplied. Pea straw, when it is to be had, is likewise given cut down, which sheep relish very much. Where there is a number of sheep to be fed, the hay and straw should always be cut by a ma-

---

* Blacklock's Treatise on Sheep.

† In the neighbourhood of Dublin early lamb is raised on a large scale for the supply of the Liverpool market. The lambs have a large allowance daily of cow's milk given them in addition to that which they receive from their dams.

chine driven either by a horse, or, where the farm admits of the thrashing machine going by water or by horse power, the machinery of either should be made to drive the hay-cutting machine. And to these same thrashing machines, a turnip-slicing machine ought to be attached, which would supply the cattle in the straw-yard, and those tied up in the stall, with cut turnips. It is found to be not only healthful for the animal, but far more economical as concerning the provender, not to fit up the stalls or cattle-feeding houses with racks, but to substitute in their place deep, wide mangers; these being filled with the chopped hay and straw, bruised grain, and sliced turnips, there can be no waste. It must have been observed by every one who examines the litter in stables and cattle-feeding houses, that there is much hay trodden under foot. When a rack is crammed with hay, the animal, generally before he begins to eat, pulls out a quantity of it, which, falling down on the ground, he selects from the mass which is most agreeable to his palate; the remainder being rejected, passes into the litter. No hay ought, therefore, ever on a farm to be put into the rack, but always to be cut by the machine into short lengths and placed before the animals in deep mangers. When cut hay with bruised oats (they ought always to be bruised) are put into the manger, the horse feeds with the least waste of provender to his owner, and having soon satisfied his hunger lies down and rests. That cut hay and straw are absolutely indispensable to sheep fed on turnips. These roots being of a succulent, laxative nature, when given to them without any hay, are apt to purge them severely and induce disease. We solicit the reader's attention to the following extract from "Sinclair's Hortus Woburniensis," a work on the "British Grasses," a publication of great practical value to the farmer. He shews in the clearest manner the necessity of supplying sheep with hay, when folded upon turnips.* It is necessary that plants having a bitter extractive principle should be supplied, to correct the purgative tendency of the turnip. The plants which compose hay abound in these qualities. With regard to the use of the bitter extract contained in hay, it may be laid down as a well authenticated fact, that it stimulates the stomach and promotes digestion. Turnips contain a large quantity of matter capable of affording nourishment to the body, but yield very little of the bitter principle. In consequence of this, sheep acquire fat rapidly for a time when placed on turnips without hay, but experiencing a want of medicinal bitter, begin with equal rapidity to lose the advantages they have gained. They may, for a few weeks, when on turnips, continue healthy, though no hay should be allowed them. But they will at last fall off. By, however, giving

---

* Sir H. Davy observes, "it appears probable that the bitter extractive matters of the grasses, are very little nutritive; but probably they serve the purpose of preventing, to a certain extent, the fermentation of the other vegetable matters in the stomach, or in modifying or assisting the functions of digestion, and may thus be of considerable use in forming a constituent part of the food of cattle. A small quantity of bitter extract, and saline matter, is probably all that is needed; and beyond this quantity the soluble matters

---

must be more nutritive, in proportion as they contain more albumen, sugar, and mucilage; and less nutritive in proportion as they contain other substances.

" To these, I may be permitted to add the results of a trial which I made on the *dung* of sheep, that had fed on turnips, as it may afford some information on the nature of turnips, as food for sheep.

" 1920 grains of the yellow Scotch turnip, on which sheep were feeding, afforded of nutritive matter 85 grains, which consisted of,

Mucilage,	9	Grains.
Saccharine matter, or Sugar,	73	...
Bitter Extractive and Saline matters,	3	...

" 1920 grains of the *dung* of the sheep which had fed on the yellow Scotch turnips, afforded of soluble matter, by means of a large quantity of water, 17 grains, which consisted of,

Animal Mucus and Mucilage,	3	Grains.
Bitter Extractive and Saline matters,	14	...

" The most remarkable circumstance here, is the superior quantity of bitter extractive in the dung, to that which is shewn to exist in the turnips; *but the sheep had hay*, on which they occasionally fed in the field, and on examining the insoluble portion of the dung (after separation from the soluble parts), nearly one-fourth part in weight consisted of the woody fibre of hay, which evidently had afforded the extra quantity of bitter extractive to the dung.

" The sheep eat of the hay from choice, and not necessity, and it is more than probable that the bitter extractive principle it contained, was, under such circumstances, the most valuable part of its nutritive matter, in supplying the deficiency of it in the turnips.

" It is worthy of observation here, that the leaves or herbage of the common pasture grasses, contain nearly the like proportion of bitter extractive, as that in the dung; the sheep, therefore, in *this instance*, had taken that proportion of hay, which, combined with the turnips, formed a natural food, or that which had nutritive qualities analogous to natural pasture.

" The dry fibre of the hay or straw given with turnips, may also assist mechanically in correcting the watery, over succulent, laxative nature of the food, in the cold season of the year in which it is given to sheep, when an excess of moisture may be more hurtful than in a warmer season."—(*Sinclair's Hortus Woburniensis, or Treatise on British Grasses*, p. 7.)

them good hay and plenty of it, they will not be long in recovering their condition.*

4. That the *manure* of the sheep, fed with such a variety of rich food, will be of much better quality. It is a well known fact, that the better an animal is fed, the more valuable is the manure produced; and by giving oilcake its fertilizing powers are nearly doubled. No dung is more valuable to the farmer than that of his sheep. It is united with a greater proportion of animal substances, condensed into a smaller compass, than in the dung of almost any other quadruped.

5. That it is one signal advantage in this management of turnips, that if any part of the field be poorer in its soil than other parts, it may be made equally rich and productive in bearing crops of grain and grass with the richer portions of the land. In feeding the sheep with cut turnips, they may be made to stand, as long as it is wished, on any particular part, and by judiciously removing the troughs to different parts within the fold, the manure may be equally well distributed all over it. There can be no more effectual plan than this of improving poor, sandy, gravelly soils. The flock, confined within the fold, tread and render the earth more compact and retentive of moisture; and by their droppings, urine, and perhaps perspirable matters exuded from the fleeces while lying on the ground, make it fitter to yield heavier and richer crops of grass and grain.

6. That the *carcass* of the sheep is not the only part of the animal which is improved by this new method of feeding. The *wool*, which is an object of great value at the present time, is produced in greater quantity, and of better quality. The more improved higher condition of the sheep, influences the quantity and quality of the fleece. "It ought never to be forgotten, that the growth of the wool is liable to be materially affected by the system of feeding pursued. It is essential to the evenness and strength of the staple, that the feeding of the animal should be uniform, without any sudden interruption or transition. Where this is suffered to take place, the natural progress of the wool is for a while most injuriously interfered with. It continues to grow, but the new fibre is unhealthy, and becomes so weak, as to snap under the operations of the

---

* See Blacklock's Treatise on Sheep. It is a work of great merit, containing much valuable practical information on the treatment of sheep. No sheep farmer ought to be without it.

manufacturer. Much wool is injured in this way by the change between summer and winter keep; and sudden transition from rich to poor, and from poor to rich feeding, ought most carefully to be avoided."*

The merino wool in Saxony, though a much colder climate than Spain, the native land of the merino sheep, we are informed from the best authority, has been greatly improved in fineness, by great attention being paid to the treatment of these sheep. Indeed, in our own island, Lord Western, at Felix Hall in Essex, has, by devoting similar attention to feeding, sheltering, and housing in bad weather in sheds with yards his merinos, prevented any deterioration in their wool. His Lordship's best fleeces, we are informed, are not inferior in any respect to any that are imported from Spain, Saxony, or Australia.

7. As another advantage resulting from this mode of feeding, it is agreed, that, according to it, there is a much smaller waste of turnip; that we have it in our power to give the animals just what kind and quantity of food we may think proper; that these useful roots, the farmer's chief dependence for the winter keep of his woolly stock, may be preserved to a late season of the year, when provender is most in demand for them. It is the opinion of good judges, that the slicing of turnips, and putting them into wooden troughs to be eaten by the flock, makes these roots go farther by one-fourth than in the old way of feeding. Every part of the root is rendered eatable. To make the turnip, therefore, go as far as possible in feeding stock of all kinds, whether in the stall, the farm-yard, or the sheepfold in the turnip field, let no farmer be without the useful turnip-cutting machine. No one in Scotland is ignorant how much our sheep suffer in a late, severe, backward spring. If any plan can be pointed out, upon which flocks may be better supported at this pinching time of the year, it surely is well worthy the attention of their owners to examine how far they can introduce it. And all these matters are of the greatest importance, and closely connected with the interest of the husbandman.

8. That wherever an experiment has been made to pen or fold upon a turnip field, two lots of sheep, equal in all respects

---

* See Complete Grazier or Farmer's and Cattle Breeder's Assistant, seventh edition.

as to age and condition, putting at Martinmas the one lot into one fold, the other into another, and continuing to feed regularly the two lots; shifting at stated times the fold to fresh portions of the field, the one lot to be fed in the usual way on the turnips, having also oilcake pounded, salt, and cut hay and straw given it, but the other to have the turnips cut into thin narrow slices, and placed in troughs before the sheep, it will be found, the lot which has had the turnips supplied to them cut by the machine, with the oilcake, salt, and cut hay and straw, will be as forward in the middle of February, as the former lot would be in April. But, should the two lots be kept feeding for twenty weeks, the lot which has had the turnips supplied cut into thin narrow slices, will fetch from 4s. to 5s. a-head more than the individuals of the other lot; that this increased value of the sheep will cover all the expense of oilcake, turnip machines, and the extra wages of attendance in working them; and that a feeder will receive a handsome return, remunerating him for what may be held by those unacquainted with this mode of feeding an extrordinary outlay.

Thoroughly convinced of the advantages resulting from this method of feeding sheep, the English agriculturists are strenuously endeavouring to promote the introduction of the plan into those places where it is yet unpractised. Accordingly, we observe at the meetings of local agricultural societies in various parts of England, that different influential individuals of these bodies are coming forward to press upon the notice of the other members the benefit of this system, which fattens the sheep sooner, and increases the fertility of the soil. Lord Huntingfield, at the meeting of the East Suffolk Agricultural Association, on the 12th of September 1839, "recommended every one feeding sheep to cut the turnips for them; instead of turning sheep into the fields among the turnips, as the advantage of cutting them by machines was seen by the tendency and aptitude to fatten the animals." Another gentleman, Mr Shaw, at the same meeting, stated, "he agreed with Lord Huntingfield on the propriety of cutting turnips for sheep, instead of turning the flocks into the fields upon them, as had hitherto been the custom in this country. The system, he believed, was greatly increasing. For years past he had himself adopted the plan.

He could not say, however, that the turnips went twice as far, but he believed that they went *one-third more than as far;* and if they made an addition of oilcake and cut hay and straw, feeding them with them as well as the cut turnips, they would find themselves amply repaid in their future crops upon light lands. He spoke confidently, because, where he did not formerly grow more than six coombs,* he had this year grown eight coombs; and that was the first time the crop had come round with wheat since the first time the turnips had been cut for the sheep, and oilcake and cut hay had been given them." (*Mark Lane Express, September* 23. 1839.)

In another part of England, viz. in Devonshire, we find at the meeting of the Taunton Agricultural Association and Cattle Show, at Taunton on the 2d December 1839, Mr E. A. Sandford, M.P., calling the attention of the members to the advantages of feeding their sheep with cut turnips. "He advised them to draw their turnips, cut them with a machine, and supply the sheep with them in due quantities." (*Mark Lane Express, December* 9. 1839.)

Another illustration of the high estimation in which it is held in England, and of the anxiety of landlords to promote this improvement, is the fact, that premiums are offered by some to encourage the introduction of it upon their estates. On his rent-day in autumn 1839, the Earl of Chichester offered a premium of a turnip-cutting machine to that tenant who had the best field of turnips, of not less than five acres, regard being had to the quality of the soil, and the general cultivation of the crops. (*Sussex Express.*)

In some parts of England the tenants have not turned a deaf ear to such important suggestions from their landlords, and are pursuing this new system of sheep feeding very extensively. The author of these observations was lately informed by a respectable tenant of the Earl of Leicester, that he had fed in Norfolk last winter ninety-three score of sheep, folded on the turnip field, with these roots cut with the machine, together with pounded oilcake, cut hay and straw, salt, and occasionally bruised oats.

The preceding statements have been confined to the manner of fattening sheep profitably for market, when folded on turnips cut by machines. We might, however, have extended our observations, by pointing out the great advantages of taking greater care of our breeding ewes than we do, by giving them more shelter, and food of better quality, two or three months before the lambing season commences. We are too much, in Scotland, disposed to manage our sheep, though the most profitable, with less care than any other of our domestic animals. We compel them to brave all the storms and hurricanes of winter. Were we, however, to expend on them somewhat of the attention we bestow upon our horses and cattle, and shield them by some shelter from the pelting merciless blasts of rain and snow, and feed them with some nutritious food, the flock would be much more profitable to its owner than at present, and many of those losses which of late years have but too often befallen the hapless animal be prevented. If some dry, snug, warm, sunny corner, not far from the barn-yard, were looked out, it would be no very costly affair for the storemaster to enclose a small yard with sheep-hurdles, of size to contain all the breeding ewes; to erect around the yard a low simple range of sheds, made out of any offal wood, or slabs or coarse boards about the premises. These sheds might be covered over with turf, broom, heath, or straw, if it could be spared. Let the breeding ewes be here confined every evening, and when the weather seemed likely to be stormy, wet, and boisterous, let them lie here, warm and dry, day and night. Under this management less tar and grease would suffice. The wool, freed from these foul anointing substances, would be whiter, and consequently bring a higher price. By bedding the sheep with straw, bracken or fern, or dried leaves, of which abundance in most places might be gathered in autumn, a great mass of valuable manure might be collected. The shelter of these sheds will ward off many fatal diseases to which the out-lying sheep are constantly exposed. By inserting, however, a letter on this subject, which appeared in the " Mark Lane Express," of 16th December 1839, from Lord Western of Felix Hall, Essex, our views on this subject will be more clearly conveyed than we can hope to express them in language of our own. With regard to sheltering sheep in winter, and otherwise managing them, Lord Western is surpassed by no breeder in the island, and any remarks, proceeding from so high authority, demand the most serious consideration of the intelligent sheep-owner. "I have a flock of pure merino, and a flock of Anglo-merino, of which peculiar sort I have exhibited specimens at the Smithfield show and at Oxford, and shall again at Smithfield next month: I have now had three years' experience of the practice, and am decidedly of opinion, that the fatting stock thrive quicker and the sheep with their lambs, also, do better than out of doors. I begin in November to put them into the yards at night, letting them out in the day. As the season advances, I shorten their going abroad, till at length they are not allowed to go out at all, except that when there happens to be a fine sunny day in winter, I let the ewes and lambs out for two or three hours upon a piece of dry ground, on which I strew some cabbages or turnips. The yard of course must be well littered. I like the litter to accumulate to a considerable depth, so as it does not heat. I think the sheep tread the straw with their little sharp feet quite as effectually as bullocks, and the manure from them is better, dependent however upon what they eat; the higher they are fed, of course, the richer the manure. I place salt for them in the yards, and the ewes and lambs consume a large quantity, the young lambs eat it with avidity. The salt which I give is of pretty good quality, not rock-salt, but small salt of the inferior sort used at table. That sheep do not suffer from confinement I have abundant other proof; the merino rams fight so furiously, that I often tie them up like horses in a stall, and keep them there from season to season, and they are as healthy as any that are out, and will get sometimes very fat. As a subject of curious experiment, I kept three pure merino wethers every year in their wool, three successive seasons, from the time of their being sixteen months old, till they were shorn of their three years' fleece, they were never out of the house, and I never knew them otherwise than healthy and in good fleshy condition, when stripped of their three years old fleece. I sent one to Oxford that was exceedingly fat, after having a fleece taken from him that weighed 28 lb., and I shall exhibit another next month extravagantly fat, with a fleece of 30 lb. weight. My folding-yards are spacious, and surrounded with sheds; these sheds are made in the cheapest possible manner, they are only ten feet deep and wide, and about six or seven feet high; built of that limited size, the wood which otherwise would be burnt, is sufficient to build them; the posts are stuck into the ground, with bearers across and covered with haulm. Other materials better suited for the purpose may be used in some countries; furze will make good walls and covering also; some persons may think it good policy to build their sheds of superior construction, but excessive cheapness, though little durable, places them within the reach of small farmers with short tenures. I have now adverted to every circumstance calculated to recommend the practice of yard-folding of sheep, of which I am a decided advocate; and I protest I know of nothing that can render the policy of the system at all questionable, where the necessary means are attainable with any tolerable facility."

---

* A coomb is equal to four imperial bushels.

When turnips are grown on strong clay land, as in Ayrshire, and in other similar soils in Scotland, and cannot be eaten off by folding sheep upon them, they might be carted to such a sheep-yard, fitted up with sheds, as just described by Lord Western, and there, being cut by machines, be given to the sheep; and in which yards they might be fed fat for market. The breeding ewes in all situations whatever, ought to have provided for them, during the winter months, such yards and sheds; and if erected of the same dimensions, and of the cheap materials, recommended by Lord Western, there are but few store-farmers who would find them beyond their means. Having such care and such feeding bestowed upon them, fewer losses at lambing time, and earlier, larger, stronger lambs would be reared. We think these matters are well worthy the attention of the intelligent sheep-farmer.

In some parts of England, we find farmers imitating Lord Western in feeding their breeding ewes during winter in sheds and yards. A respectable farmer in Suffolk states, in the "Mark Lane Express," of December 23. 1839, "that he is now building a complete sheep-yard, with sheds, for 400 ewes, as his plan is to house them in winter. Last year, he made 150 loads of manure, which would have been wasted, or deposited where it would not have been available, and, in my opinion, it is equal to any manure for turnips."

An interesting experiment, lately made with great pains and accuracy by Mr John Wallbanke Childers, M. P., in feeding sheep in a yard with a shed, is detailed in the Journal of the "English Agricultural Society," vol. i. part ii. p. 169. This experiment supports the valuable advice given by Lord Western in the letter we have just inserted, on the great advantage of feeding sheep in winter in yards with sheds:—

> "Having tried an experiment on the winter fattening of sheep this year, I think the insertion of it in our Journal may be desirable. It has for some time been my opinion, that sheep would fatten more quickly in a yard than in the usual manner on turnips in the field. In consequence of this view of the case, I last winter enclosed a small yard with posts and rails, and erected a low thatched shed, just large enough to allow a score of sheep to lie down at once. The floor of this shed was boarded with common rough slabs, and was raised eighteen inches above the surface of the ground, the boards being placed three-eighths of an inch apart, in order to allow the free passage of water, and keep the boards dry, as my great fear was that the sheep might get the foot-rot.
>
> "I then proceeded, on the 1st January, to draw forty wether hoggs out of my Leicesters, and divided them into two lots, as equal in quality as I could get them. On weighing each sheep separately, I found the weight of one score to be 183 st. 3 lb., and that of the other 184 st. 4 lb. I put the first lot into the yard, and placed the other lot on turnips. The field was a dry sandy soil, and well sheltered, and peculiarly favourable and healthy for sheep. Each lot had exactly the same quantity of food given them, which was as follows:—"*1st,* As many *cut* turnips as they could eat, which was about 27 st. per diem for each lot. *2d,* 10 lb. of linseed-cake, at the rate of half a pound per sheep per day. *3d,* Half a pint of barley per sheep per day. *4th,* A little hay, and a constant supply of salt. For the first three weeks, both lots consumed equal portions of food: but in the fourth week there was a falling off in the consumption

of the hoggs in the shed of 3 st. of turnips per day; and in the ninth week there was a falling off of 2 st. more. Of linseed-cake there was also a falling off of 3 lb. per day. The hoggs in the field consumed the same quantity of food from first to last. The result of the experiment is as follows:

	20 Shed Hoggs.	Increase.	20 Field Hoggs.	Increase.
	St. lb.	St. lb.	St. lb.	St. lb.
January 1,...........	183 3		184 4	
February 1,...... ...	205 0	21 11	199 8	15 4
March 1,.............	215 10	10 10	208 2	8 8
April 1,..............	239 9	23 13	220 12	12 10
Total Increase,		56 6		36 8

Consequently the sheep in the shed, though they consumed nearly one-fifth less food, made above one-third greater progress. The circumstances of the experiment were, if any thing, unfavourable to the sheep in the shed: the turnips, by being stored in a house for their use, became drier than those consumed by the sheep in the field; and also in February the shed-hoggs were salved or rubbed with mercurial ointment, which is generally supposed to give a check to feeding sheep.

" N. B. The boarded floor was swept every day, and fresh straw was given after every shower of rain."

From this important trial of the comparative merits of feeding, in the open field, and in a yard with a shed, Mr Childers establishes a very valuable fact, that shed and yard feeding of sheep economises greatly their food, and sooner fattens the animals, than leaving him to brave the inclemency of the elements out of doors.

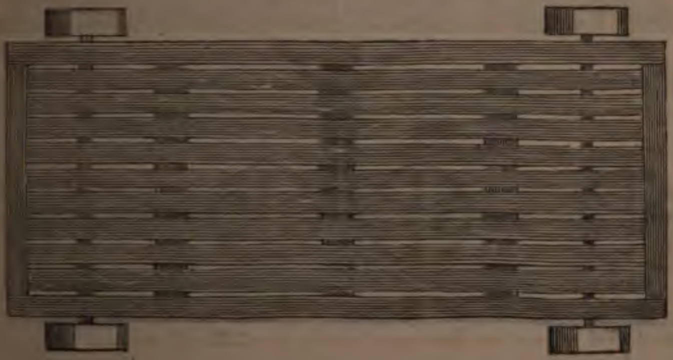
In fattening of sheep, dryness of feet and of fleece are necessary; cold can better be endured than the former conditions. From the same experiment, we are also taught, that twenty sheep fed in the shed acquired not far from *one stone* per head more than twenty others of the same weight fed in the same manner in the field, from the 1st of January to the 1st of April. This increase of weight cannot be estimated at less than 8s. per head, and at 10 per cent. on the value of the sheep.*

Having provided for the comfort of the breeding ewes, by sheltering them from the storms of winter in yards with sheds, let us not forget to provide the same comforts for the outlying flock, folded on the turnip field, and consequently exposed to many a pelting shower of snow and sleet, and many a biting blast. For that purpose, we think there might be contrived movable wooden sheds, which, being placed on wheels, where the land was not too uneven, might easily and expeditiously be moved from one part of the field to the other, whenever it was intended to move the fold. The following dimensions are suggested:—The shed to be made of any refuse sort of wood, to be about 7 feet wide, 5 feet high, and to be made in separate parts of 15 feet long each, and having a wooden floor or bottom. Thus the sheep would lie dry, as all moisture, from the boards or slabs being laid a little apart from each other, would pass away. This wooden floor to be placed on four iron wheels, which would raise the floor six inches off the ground. Into the wooden floor to drive four or more wooden posts, either of fir or larch. Upon these the roof would be fastened. The bars or hurdles used for enclosing the fold, against which the movable shed would stand, to be roughly closed up with slabs or boards, to prevent the passage of cold and wet through them. When it was wished to move the fold to any other quarter of the turnip-field, two men or a poney would not be long in drawing the movable sheds to any part of the enclosure. The expense of each of these portable sheds would not exceed L.4. About one score of sheep would be contained in one of them. Under these dry, warm, portable sheds, the fattening sheep would be comfortably lodged in all bad weather; and thus lying warm and dry, they would sooner take on flesh, and yield more wool.

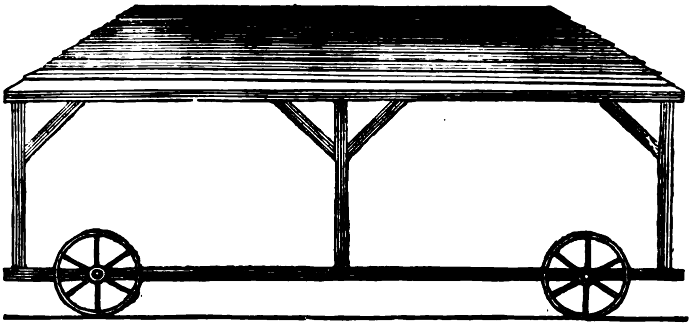
---

* See Miscellaneous Notices, No. XX.—EDITOR.

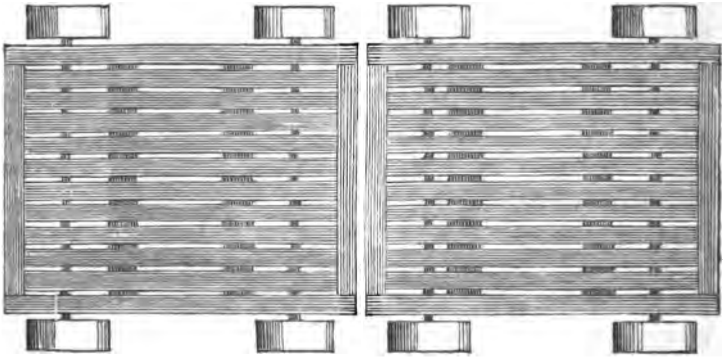
Floor of Long Movable Shed.



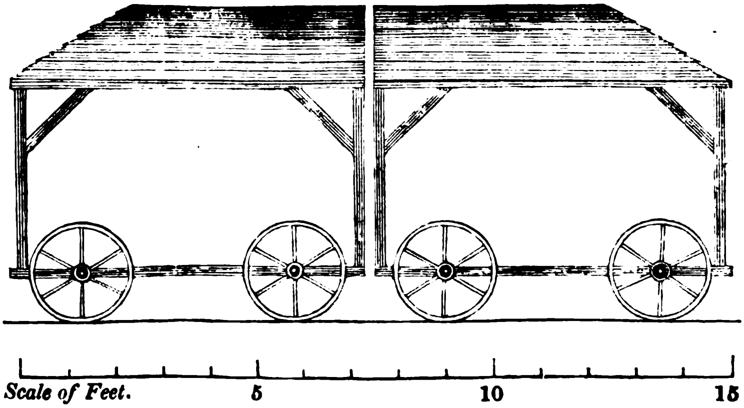
Elevation of Long Movable Shed.



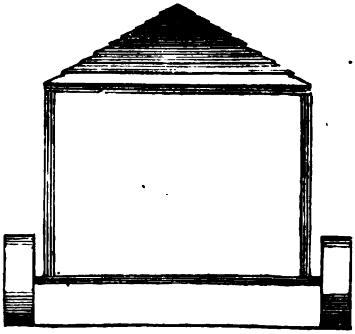
Floor of two Short Movable Sheds, forming one long one.



Elevation of two Short Movable Sheds placed together, to form one long one.



Elevation of the End of either size of Movable Shed.



In the particulars we have brought forward in favour of an improved system of feeding farm-stock, we have had it principally in view to call the attention of the Scottish agriculturist to the manner of feeding sheep on turnips in the eastern counties of England. Much, however, of what we have stated in explaining the system of feeding sheep, is applicable to cattle. These animals, like sheep, have eight front cutting teeth, none in the upper jaw, and only in the lower; and their front teeth in the lower jaw are liable to many of the accidents and changes from age that are attendant upon those of the sheep. It is therefore as indispensable that cattle, when fed on turnips, and which we wish to feed rapidly, and in the least wasteful manner, should have them presented to them cut into slices. The hay which is allowed them ought also to be cut for them by a hay-cutting machine. If this article be supplied them in racks, or in other ways, there will be a great waste, as the cattle, like horses, tread under foot nearly as much as they consume. Whatever other food be given with turnips, let salt always be freely offered feeding cattle, as also cows, which makes the latter yield more milk.

We think that every one who reflects upon the subject will readily admit, that the mode of feeding which we have endeavoured to describe, is a material improvement upon that formerly pursued. It recommends itself, not by one, but many advantages.

1. It preserves the teeth of the hogg or young sheep, and the older animals; and, should these unfortunately have dropped out, enables them to satisfy their hunger in a short time, to rest, and to ruminate.

2. That they become fat in a shorter time.

3. This variety of rich food improves greatly the quality of the manure.

4. The poorer parts of any field may be enriched equally with the better parts of it, by keeping the sheep standing on them as long as it is thought advisable.

5. The wool, from the higher keep of the animal, is improved in quality, and increased in quantity.

6. The turnips can be husbanded, to feed more sheep, and preserved to a later period of the season, when they are most needed.

7. Experiments made upon two lots of sheep, in all respects equal, feeding the one in the old, the other in the new way, shew the advantages of the latter over the former; the one lot, within the same time, greatly excelling the other, both in flesh and fleece.*

---

* In confirmation of the statements we have advanced in favour of feeding sheep while folded on turnips, in the way just described, we have much pleasure to strengthen ours, by laying before the reader the opinions of one of the most intelligent and practical farmers in the Wolds of Lincolnshire. This gentleman, Mr Francis Iles of Barnoldby, not only farms his own beautiful estate, but rents a very extensive tract of land from the Earl of Yarborough. This gentleman states, as respects the seventh statement we have put forward respecting the feeding two score of sheep, one on turnips in the old way, the other by giving them cut by machines: " There cannot be a doubt, that the score which have the turnips cut for them will be much sooner fit for market, and will fetch from 3s. to 6s., or, I think I might say, from 4s. to 8s. per head more than the others, that are not cut for them. There are many reasons why this should be the case: they get their food in a cleaner and more regular manner; and, when they become accustomed to the troughs, which they generally do in a few days, they can fill themselves in a much shorter time, consequently having a much longer period for rest, which is a very essential point. They also get their food much earlier in the morning, our plan being to cut a large tubful of turnips over night, which are served out to them the first thing in the morning, and during the time they are eating them, the man is cutting more for them, until they are satisfied, and go to rest; and, by the time they again rise, the troughs are all replenished, and so on during the day, always taking care to leave them full at night. Another reason why cutting turnips for sheep is so beneficial, is, that during the winter and spring months, the hoggs lose their teeth always in the spring, and very frequently much earlier in severe seasons, from the turnips being hard from the frost. It is therefore obvious, when this is the case, that cutting for them must be not only beneficial, but highly necessary, as it is impossible for them in that state to procure sufficient food in the natural way. Great regularity and good management, however, must be observed when cutting turnips for sheep. In fact every thing depends upon it, as, when the hoggs have once become accustomed to the troughs, they require to be well served, and plenty cut for them, as they will not then look out for themselves, but appear to wait for a regular supply. I have in several instances seen the whole of the expense of cutting turnips thrown away by bad management, and want of regularity. It has become almost proverbial with us, " *better not cut at all than not cut enough.*' One man and a boy will cut for about 260 hoggs, and do them well. I have at present four machines going, with a man and a boy to each; and these machines, worked by these hands, cut each for about 260 hoggs. This season has been a very bad one for turnip

The above observations were collected during a recent visit to England. It is hoped the reader will overlook the imperfect and hurried manner in which they have been put together, and direct his attention to the considerations of the advantages which are certain to accrue to him by adopting the new and improved method of management pointed out. Our sole and anxious aim and object in publishing these remarks, is the hope we cherish, that they may be instrumental in exciting inquiry among the intelligent tenantry of Scotland upon a subject so important.

Allusion having been made to Holkham, it may be observed, that, among the places visited, it is to be included. To the kindness and hospitality of the Earl of Leicester, the proprietor of that splendid estate, we are greatly indebted for an opportunity of inspecting all the operations, many of them highly interesting to the lover of good husbandry, in progress upon his Lordship's extensive and well managed farm. Here it was that the system of feeding sheep on turnips cut by machines was seen to the best advantage. Every one who visits Holkham must be struck with what that public-spirited and enlightened nobleman has effected during a long life devoted to agricultural pursuits. By continued and unceasing perseverance, Lord Leicester has converted an immense district of wilderness into a highly productive and beautiful country, yielding rich and luxuriant harvests,* adorned everywhere with woods in a most healthy and thriving condition, and

---

sheep generally, having had so much rain. The sheep have scarcely ever been dry, and the land has been in a very dirty state. When hoggs are fed with cut turnips, they are frequently made fat, clipped, and sold in the latter end of April and beginning of May. We sometimes give them barley and malt-combs. The latter answers well in the beginning of the season. We fancy it keeps them healthy. But oil-cake is more generally used than any other artificial food, as we find that the manure of the sheep fed upon it is highly beneficial to the land on our Lincolnshire Wolds. The sheep wooden troughs we use are of various dimensions and sizes. Those I use are about 10 feet long, 7 inches deep, with an 8-inch bottom. The trough is nailed upon two logs of wood, about 5 inches deep, placed about one foot from each end of the trough."

* We are assured, from the very best authority, that, forty years ago, at the little sea-port of Wells, not far from Holkham, not more than 10,000 quarters of wheat were annually imported, for the supply of the neighbourhood. But now, from the great improvements of Lord Leicester an his estates, the same little port exports 20,000 quarters of wheat, though the population has perhaps doubled, or more than doubled, in that period.

managed on the most scientific principles, interspersed with farm-buildings, commodious, and conveniently put down in the midst of the farm, in which will be found an industrious, hospitable, and well-informed tenantry, grateful to their liberal landlord for the comforts which they enjoy; among which, not the least, is the secure holding of their farms, not the uncertain tenancy of from year to year, but on a lease of twenty-one years' duration. In this happy security in their tenure, we discover one of the main causes of the superior cultivation and prosperous condition of the tenantry upon the estate of Holkham.*

ON THE USE OF GASEOUS SUBSTANCES TO VEGETATION.

By Cuthbert W. Johnson, Esq., Corresponding Member of the
Maryland Horticultural Society.

It is not, I think, necessary in drawing the cultivator's attention to the uses of that great portion of the food of plants, which they imbibe in the state of gas, or of aqueous vapour, to enlarge upon the importance of the question, since that is a truth which, as illustrating the value of certain modes of cultivation, I hope to render intelligible in the following paper, as I examine in succession the advantages of the gases and vapour of the atmosphere, as well as those emitted during putrefaction, to the commonly cultivated crops of the farmer. And even if the accomplished farmer shall dissent from some or all of my conclusions, he will yet readily admit that all such observations, with regard to the habits and food of plants, and their ready absorption by the soil, cannot be too generally understood and acted upon by the cultivators of our island.

That the atmospheric air exerts an extensive and very important influence upon vegetation, is a fact which has been well known from the earliest days of agriculture. Too many circumstances combine to render this truth apparent to the very meanest cultivator for it long to escape observation. The superior luxuriance of the *borders* of all growing crops, from those of the field to the outer circle of timber in a wood, naturally pointed out that *something* was gained by these, of which the inner sheltered portions were partially deprived. And that this something was the air of the atmosphere, appears to have been the conclusion of the early Italian cultivators, who, on all occasions, were attentive to let their crops enjoy as much of the breeze as possible,—an object which they endeavoured to attain, not only by an attentive consideration of the natural and acquired habits of the plants in transplanting them, but also by increasing the access of air to their roots by deep and regular periodical stirrings of the soil around them. Thus Cato, the earliest of their agricultural writers, whose works remain to us, when instructing the Roman farmers as to the best mode of cultivating the vine and the olive, advised them, if they wished their vines and olive-trees to grow luxuriously, to stir the trenches around them once a-month, until they were three years old; and he adds, " bestow the same care upon other trees."* And Virgil, when commending the very doubtful plan of paring and burning lands, alludes to the same well known advantage of a free and copious supply of air to the roots of plants, when he says, " the heat opens more ways and hidden rents for the air, through which the dews penetrate to the embryo plants."† They, in fact, considered, in common with the Greek philosophers, that air was one of the four elements of which all substances were composed; but then, as in those days, the air of the atmosphere was considered to be a simple body, we need not search in the works of the early agricultural writers for any evidence of very definite ideas of the mode of its action. That the air they breathed was highly serviceable to plants of all kinds was the extent of their information; they had no knowledge of the existence of three distinct gases in the atmosphere. That was a discovery reserved for modern ages—for the days of Priestley, and the dawn of pneumatic chemistry in England. When, therefore, the early cultivators made the observation, that the free supply of air to the leaves and roots of plants materially promoted their growth, they did what too many modern agriculturists have since done, merely noticed the effect without making any very accurate inquiries as to the cause of the benefit; they were too often content, in fact, with merely substituting words as an application of facts. It is probable that the early Greek and Italian philosophers were farther led to this knowledge of the advantages of air to vegetation, from noticing the power which some eastern plants possess, such as the *Flos aeris* and others, of entirely supporting themselves upon the nourishment they derive from the atmosphere, even when suspended by a string from the ceiling of a room, —many parasitical plants subsist upon hardly any thing else; thus, some of the mosses of this country cling to life, and even grow well, in situations where hardly any thing except air and moisture can nourish them,—some of the aloe tribe require scarcely any thing else.

---

* Having submitted these remarks on the improved method of feeding sheep, while folded upon turnips, we feel exceedingly anxious that it should be adopted more universally in Scotland. Might we suggest (without presuming too much) to the Highland and Agricultural Society of Scotland, to take into consideration the propriety of holding out a premium to those who should follow the plan described, and carry it out in the most perfect manner?

---

* Lib. 43. † Georg. 1. 90, 91.

Carbonic Acid Gas.—When, however, later ages had acquired the knowledge that it was only a portion of the air that maintained vegetable and animal life, or supported combustion, new views opened upon the chemical philosopher. It became then a question of considerable interest to ascertain which portion of the atmosphere it was that the plant absorbed; and it was speedily ascertained by Dr Priestley and other chemists, that the portion of the atmosphere which the leaves of all plants absorb in the light is the carbonic acid gas or fixed air—a gas composed of 27.27 parts carbon, and 72.73 parts oxygen,—and that this carbonic acid gas is always contained in the atmosphere, in the proportion of about one part in five hundred. The question thus became one of some interest to ascertain, whether a still greater volume of carbonic acid gas would promote, in a still greater degree, the growth of plants, such as in an impure confined portion of air spoilt by the breathing of animals, or exhausted of its oxygen gas or vital air by combustion, since both these varieties of air contain a very considerably increased proportion of carbonic acid gas. Many very accurate experiments speedily demonstrated that such foul air materially increased the luxuriance of vegetables confined in them, and that plants possessed also the power of restoring to such exhausted air, the portion of oxygen which either fire or the breathing of animals had removed —thus, a confined portion of air, in which a mouse had died in ten minutes for want of air, having had a sprig of mint introduced into it for some hours, was then found to be so replenished with vital air, that a second mouse being placed in it lived as long as the former mouse; and, by similar treatments, a lighted taper being *merely* substituted for the mouse, a similar effect was produced,—the exhausted air was again replenished with oxygen gas.

These facts opened naturally new views. It then became an interesting object to ascertain the proportion of the carbonic acid gas in the atmospheric air, which possessed the maximum advantage to vegetation, and it was found, that, in pure carbonic acid gas, plants would not vegetate at all, or in air containing 75 per cent. of it, but that, when the proportion present in common air was reduced to 50 per cent., that then the plants confined in it slowly vegetated, and that they grew better when the proportion was 25 per cent.—still better when it was 12½ per cent.—and that, when it was reduced to only 9 per cent., then they flourished much better than in common atmospheric air. It was remarked, however, that the increased presence of carbonic acid gas was only beneficial to plants when they were vegetating in the light, but that, when this was excluded, the carbonic acid gas was rather prejudicial to their growth than otherwise; that, in fact, all plants, though they *absorb* it in the light, yet in the dark *emit* this gas. It was ascertained, however, that the presence of it in their atmosphere was absolutely essential to all plants vegetating in the light; that they grew when it was present, and that all vegetation was stopped by its withdrawal.

These results naturally led to the additional inquiry, Whether the presence of carbonic acid gas in water produced the same results on plants, since it was well known that, when plants were immersed in water, and exposed to the sun's rays, they emitted bubbles of oxygen gas, by decomposing the carbonic acid gas, and setting its oxygen free. Various kinds of water were tried, containing different proportions of carbonic acid gas; and the beneficial result upon vegetation was found to be exactly proportionate to the quantity of carbonic acid gas which they contained. In pump-water, they yielded the most oxygen; from river water a smaller quantity; but from boiled water, little or none. Now, by boiling, all the gases are driven out of water; and this is the reason why such water is flat and insipid. And yet it was found, that when the boiled water was again impregnated with carbonic acid gas, those plants confined in it, emitted as much oxygen gas as they did before it was boiled; and, finally, that when the plants had exhausted the water of carbonic acid gas, then they ceased to emit oxygen.

The quantity of carbonic acid gas which is emitted by various plants, varies in different species. Thus, M. Saussure found that the *Lythrum salicaria* absorbed in twelve hours seven or eight times its bulk; while the *Cactus opuntia*, in common with other fleshy-leaved plants, did not absorb above one-fifth of that amount. In these experiments, however, the atmosphere in which the plants were confined contained 7½ per cent. of this gas; so that when they are vegetating in the open atmosphere, in which the proportion of this gas does not exceed one part in a thousand, the quantity absorbed is considerably less.

This absorption of the carbonic acid gas, the cultivator should clearly understand, influences in a great degree the composition of the plant. All those vegetable carbonaceous nutritious substances which are found in plants, such as gum and sugar, are increased in quantity by its copious supply; for when this gas is no longer secreted by the plant, its health becomes languid, and its composition more watery. Thus, a *Byssus* vegetating in the dark (when carbonic acid gas is *emitted* by plants) was analyzed by M. Chaptal, and found to contain only 1–89th of its weight of carbonaceous matter; but when, after it had been allowed to vegetate for thirty days in the light, and was again examined, it was found to contain 1–24th of its weight of carbonaceous matter. Similar results were obtained by M. Sennebier, who found, that, when plants were made to vegetate in the dark, they contained much less oil than those vegetating in the light; their resinous matter being then as 2 to 5½, compared with those vegetating in the light. They had even less earthy matters by one-half;

but then they had exactly double the quantity of water that the light-growing plants possessed.

Such, then, are the results of the free access of the carbonic acid gas of the atmosphere to the leaves of plants,—it promotes their growth, increases their vigour, and enriches their secretions. The application of the same gas to their roots, although it has not been examined with the same care as its action upon their leaves, is yet evidently attended with the highest advantage. Thus, this gas is one of the constant products of putrefaction, wherever this is going on—as over stagnant drains, dung-heaps, and other putrefying matters—there vegetation is sure to be rankly luxuriant, and that, too, in situations where the roots of the plants are far removed from immediate contact with other decomposing organic matters. This may be easily shewn by the repetition of a very simple experiment, which was first made by Davy. This great chemist filled a glass-retort, capable of containing three pints, with the hot fermenting dung and litter of cattle, and examined the elastic fluids which were generated. In thirty-five cubic inches which were thus produced in three days, he found twenty-one of carbonic acid gas, the remainder being chiefly nitrogen; and after thus ascertaining the composition of these gases, he introduced the beak of another retort, filled in a similar manner, in the soil under the roots of some grass growing in the border of a garden. In less than a week, a very remarkable effect was produced on the grass exposed to the action of these gaseous matters of putrefaction; their colour became deeper, and their growth was much more luxuriant than the grass in any other part of the garden. And hence, too, is derived one of the chief advantages of applying organic matters to the soil, and that in as immediate contact with the crop as possible, just as is effected when manures are added to the soil by the drill; for the roots or leaves of the plants are, by the adoption of this plan, immediately in contact with the evolved carbonic acid, and other gases of putrefaction: they are thus readily absorbed as they are generated, and nothing is lost by escaping into the atmosphere. The gas, in fact, is instantly, yet gradually, transmuted from the putrefying products of the farm-yard into the flour of the wheat, or the nutritive matters of the grasses. And there is yet another chemical reason why the manure-drill, or any other machine, should be adopted by the farmer to bring, as closely as possible, every plant into immediate contact with the decomposing manure he applies to his soil; and that is, the superior readiness with which, in all cases of decomposition, the disengaged substance enters into new combinations at the very instant of its disengagement, than it does after it has been completely formed. Thus, to give an instance, during the putrefactive fermentation of vegetable substances, a quantity of nitrogen is disengaged; and if this takes place under certain favourable circumstances,—such as the presence of calcareous matters, potash, and a dry, warm temperature at the moment it is formed,—the nitrogen combines with oxygen, forms nitric acid, unites with the potash, and thus nitrate of potash, or saltpetre, is formed; but if the nitrogen is once fairly disengaged, almost every endeavour of the chemist has failed in making it unite with oxygen, so as to form the acid of saltpetre.

In every way, therefore, in which the question of applying manures in immediate contact with the roots of plants can be viewed, the more advisable does the adoption of the practice appear.

Oxygen.—Oxygen gas, or vital air, which constitutes twenty-one per cent. of the bulk of the air we breathe, is absolutely essential to the growth of plants. If this is withdrawn from the atmosphere, they will no longer vegetate,—their leaves can no longer perform their functions. But this use of oxygen by the leaves of vegetables is confined to the night; it is only in the dark that they absorb it. During this absorption, the leaves of some plants—such as the *Cactus opuntia* and the *Sempervivum tectorum*—do not emit any portion of carbonic acid gas; but the great majority of plants—such as the *Quercus Robur* and the *Sedum reflexum*—emit a considerable portion, but not equal in amount to the oxygen gas which has been imbibed; and this absorbed oxygen enters, there is little doubt, into immediate combination with other substances, and forms vegetable matters in other shapes. A variety of experiments have, in fact, been made, to ascertain this. Thus the leaves of plants, which have not recently absorbed a portion of oxygen gas, have been exposed in the exhausted receiver of an air-pump. Other leaves have been submitted to the greatest heat they could bear without undergoing combustion, but in neither case was any oxygen gas extricated from them. And it has been noted that those plants which absorb the greatest proportion of oxygen during the night, are precisely those which evolve the most considerable quantity of carbonic acid gas during the day.

Plants of different kinds vary very much in the quantity of oxygen which they absorb. Fleshy-leaved plants, which emit little or no carbonic acid gas, absorb very little oxygen; and these plants, it may be remarked (says Dr Thomson), can vegetate in elevated situations, where the air is very rarified. Next in order come the evergreen trees, which, although they absorb more oxygen than the fleshy-leaved plants, yet require much less than those which lose their leaves during winter. Those plants which flourish in marshy ground likewise absorb but little oxygen. M. Saussure tried a great number of experiments on this subject, with a variety of plants of different kinds. The following are some of his results: in every case, the weight of the leaves is supposed to be equal to 1.00,[*] and the bulk of oxygen is expressed in the table.

		Quantity of Oxygen absorbed.
Leaves of Evergreens.		
Prunus Laurocerasus,	May,	3.20
Vinca minor (Lesser Periwinkle),	June,	1.50
Pinus Abies (the Fir),	September,	3.00
Juniperus Sabina,	June,	2.60
Leaves of Trees which lose them in Winter.		
Quercus Robur (the Oak),	May,	5.50
Populus alba (the Abele),	May,	6.20
— —	September,	4.36
Amygdalus Persica,	June,	6.60[*]
— —	September,	4.20
Rosa centifolia,	June,	5.40
Leaves of Herbaceous Plants.		
Solanum tuberosum (the Potato),	September,	2.50
Brassica oleracea (the Cabbage), — — young leaves,	September,	2.40
— — old leaves,	September.	2.00

---

[*] Recherches, p. 99.

Laeves of Herbaceous Plants.		Quantity of Oxygen absorbed.
Vicia faba, before flowering,		3.70
— in flower,		2.00
— after flowering,		1.60
Brassica rapa, in flower,		1.25
Avena sativa (the Oat),	June,	2.70
Triticum æstivum,	May,	5.00
Pisum sativum,	May,	3.72
Ruta graveolens,	August,	2.00
Leaves of Aquatic Plants.		
Alisma plantago,	August,	0.70
Polygonum persecaria,	September,	2.00
Lythrum salicaria,	May,	2.30
Carex acuta,	May,	2.25
Ranunculus reptans,	September,	1.50
Leaves of the Fleshy Plants.		
Cactus opuntia,	August,	1.00
Agava Americana,	August,	0.80
Sempervivum tectorum,	July,	1.00
Stapelia variegata,	July,	0.63

Saussure continued his researches upon the uses of oxygen gas to vegetation. He found that it was essential to many of its functions,—that it was absorbed not only by the leaves, but by the roots of plants,—that it then combined with carbon, and the carbonic acid gas thus formed was thence transmitted to the leaves to be decomposed,—the very stems and branches of plants absorb it, and its presence is essential to the expansion of flowers,—in its absence, seeds will not germinate, and hence the reason why they will not vegetate when placed beyond a certain depth in the soil,—the quantity of oxygen gas consumed during their germination, by equal weights of different seeds, varies considerably. Wheat and barley consume less oxygen than pease, and pease less than common broad and kidney-beans,—the latter consuming $\frac{1}{100}$th part of their weight, while wheat and barley, during their germination, only absorb from $\frac{1}{1000}$th to $\frac{1}{2000}$th their weight of oxygen gas. Recent experiments have shewn also, that the more water is impregnated with oxygen gas, the more excellent are its effects when employed for the purpose of watering plants, and hence one of the causes of the superiority of rain-water. Some recent experiments were made by Mr Hill, which clearly demonstrated these facts. Hyacinths, melons, Indian corn, and other plants, were watered for some time with water impregnated with oxygen gas; the first grew with increased beauty and luxuriance, the melons were improved in flavour, the Indian corn increased in size, so as "to equal in size most of those imported from North America," and all of them grew more vigorously.

The uses, therefore, of oxygen gas to plants are many and important, and accord with the conclusions which naturally suggest themselves from the results of the analysis of vegetable substances, from whence oxygen is never absent; it must be therefore one of the necessary supporters of vegetable life.

Nitrogen.—This is the last atmospheric gas, which exerts its influence upon vegetation, and enters in small proportions into the composition of plants. Entering in the large proportion of 79 per cent. into the composition of the atmosphere, it is yet supposed to exert but a slight influence upon vegetation. It is found in much smaller proportions in plants than either oxygen gas or carbonic acid gas, although recent researches have shewn that it is much more commonly present in vegetable substances than was once supposed,—and, as I have elsewhere observed,* that it exerts a more sensible influence upon their growth than is commonly believed is very certain, and that the proportion of it present in them varies with the different states of their growth, has been clearly shewn by the experiments of Mr Robert Rigg, who found in 100 parts of the flour of wheat,

	Parts of Nitrogen.
Not nearly ripe,	2.9
The same nearly ripe,	2.3
Leaves of wheat not nearly ripe,	3.3
... ... nearly ripe,	2.1
Stem of wheat unripe,	3.5
... ... nearly ripe,	1.3
Chaff of wheat unripe,	1.8
... ... nearly ripe,	1.3
Common grass, not growing freely,	4.4
... ... growing freely,	5.6
Turnip, when attacked by the fly,	8.0
Cabbage not attacked by insects,	8.1
... partly eaten by insects,	5.7

---

* On Fertilizers, p. 338.

	Parts of Nitrogen.
The insects themselves,	14.0
Red clover stems,	2.5
Leaf,	4.2
Flower,	3.6
Potato itself,	2.9
... stem,	3.1
... leaves,	8.5
... apple,	3.9
... corolla,	3.9
... pistils,	4.6

It is also well worthy of the farmer's attention, that Mr Rigg found that, when barley was made to vegetate in the shade, the increase in the quantity of its nitrogen was found to be nearly 50 per cent., but when vegetating exposed to the direct rays of the sun, that then the increase was only 30 per cent.; and he also made the observation, that the more rapidly the plants vegetate, the more nitrogen they are found to contain. It is also well known to the cultivator, that plants growing in the shade have usually a deep green colour, vegetating with much luxuriance, and that certain animal manures applied to plants produce similar results in a remarkable degree, such as gelatine, oils, urine, blood, fish, &c. Now these fertilizers all contain nitrogen, and which gas must be evolved in some shape or other during their decomposition in the soil. Gelatine, containing 16.998 per cent., albumen 15.705, the fibrin of blood 19.934, urea 46.66 per cent.; and although nitrogen usually exists in plants in very small proportions, yet I am entirely disposed to agree with Mr Rigg in his conclusion, that more attention should be paid than has hitherto been done in the examination of vegetable substance, "to those products, which, though so minute in quantity as to be with difficulty detected in our balances, have nevertheless been wisely assigned to discharge the most important functions."*

Such, then, are the essential and highly important uses of the three gases of the atmosphere, nitrogen, oxygen, and carbonic acid, to all vegetation; an attentive consideration of which will explain to the farmer the cause of many of the phenomena he daily witnesses, and suggest to him unanswerable arguments for the adoption of those modes of cultivating his land, the results of careful and scientific investigations, which such chemical investigations suggest and render intelligible.

---

* Phil. Trans. 1838, p. 406.

Thus the absolute necessity for all crops receiving a regular supply of carbonic acid gas, will explain to him why his crops always yield an inferior produce when they are surrounded by thick plantations of timber trees; and why the portion of all kinds of plantations growing on the side of the field the most exposed to the winds, is almost always of the most luxuriant growth; it will explain to him the reason why many skilful farmers drill their corn, so that the most prevalent winds may, with the more facility, circulate *along* the rows, instead of across them; and why all farmers find that their crops prosper better in moderately windy weather than in calms; since, in all these instances, and in many other well known popular observations of the same kind, the copious supply of the carbonic acid and oxygen gases of the atmosphere is naturally impeded by thick plantations of other vegetable substances, and promoted by the winds.

The consumption of oxygen gas by the *roots* of plants, and their increase of growth and vigour when their usually impeded supply is increased, is equally fraught with instruction to the cultivator, for it serves to explain the reason why stirring the soil around the roots of trees, according to the fashion of the early vine and olive cultivators of Italy, or merely disturbing the earth between the rows of cabbages and turnips, as practised by the best English farmers, is attended with decided advantage, since it lets the air penetrate more freely to their roots. It renders apparent, too, one of the chief reasons why mere subsoil-ploughing adds so materially to the luxuriant produce of even the poorest cultivated lands, since, as the soil is deepened and pulverized, the atmosphere more freely and more copiously penetrates to the roots of the vegetation it supports. The same facts explain the advantages of deep-ploughing, of sub-turf ploughing, and of trenching; why the indolent farmer in vain tries to render productive his shallow-ploughed lands; and why, when the industrious cottager encloses his garden from the barren waste, too poor to sufficiently manure it, he yet renders it productive of excellent crops, by merely trenching it to the depth of eighteen or twenty inches.

And it is vain for the cultivator to urge, that this benefit is not to be mainly attributed to the freer circulation in the soil of the gases and watery vapour of the atmosphere, but that it is owing to the mixture of the surface-soil with the substratum. For such a conclusion is not only opposed by the fact, that many soils do not differ in composition from the substratum on which they rest, and yet are materially benefited by trenching or subsoiling, but is contradicted by many agricultural facts with which every cultivator is familiar; and if any other answer was requisite, that would be amply supplied by the recent experiments of Sir Edward Tracey, with his new subturf plough, which merely passes under the turf at a depth of ten inches, and disturbs and loosens very effectually the soil; but when the plough has passed under, every thing resumes its former position, although every portion of the superstratum has been thoroughly agitated, and rendered more permeable to the atmosphere. The soil is neither displaced or mixed, and yet this mere *loosening* is productive of the highest advantage, the produce of grass is extensively and permanently improved. Sir Edward Tracey, after describing the increased produce of the grass as being very remarkable, tells us, that "there are no marks left by which it can be known that the land has been so ploughed, except from the lines of the coulter, at the distance of about fourteen inches one from another. In about three months from the time of ploughing, these lines are totally obliterated, and yet the quantity of aftermath, and the thickness of the bottom, have been the subject of admiration of all his neighbours.*

And then with regard to the carbonic acid and the carburetted and sulphuretted hydrogen gases evolved during the putrefaction of animal and vegetable manures, the discoveries of the chemist are equally instructive and confirmatory of the observations of the intelligent farmer; the one finds that these gases, so grateful to the farmer's crops, are the most copiously emitted in the early stages of putrefaction,—that these gradually decrease in volume as the fermentation proceeds, and finally, when the mass is reduced to the state of vegetable mould, cease altogether. Now the farmer is well aware that the manure of the farm-yard, in common with all organic decomposing fertilizers, is by far the most advantageously applied, and produces the most permanent good effect when it is used in the freshest state that is at all compatible with the destruction of the seeds of weeds, with which such collections usually abound. He is aware, that in all situations where the gases of putrefaction are emitted, such as near to stables, marsh-ditches, covered drains, &c., that there vegetation of all kinds indicates by its rank luxuriance that some unusual supply of nutriment is afforded; the gardener in his best arranged hot-beds notices that the gases which ascend from his piles of litter through the earth (which earth is not in immediate contact with the dung), produce the same effects long after all the *warmth* of putrefaction has subsided. The growth of some of his plants is in this way *stimulated*, he says, in an extraordinary manner. These facts, these observations, are entirely confirmed by those of the chemist. He notices that all the gases of putrefaction are exactly those which are the most grateful to the growth of plants,—that air which has been spoilt by the presence of the gases evolved in putrefaction, or by the breathing of animals, is exactly that which is the most grateful to vegetation; and that where these gases are applied to the roots of plants in the most skilful manner, so as to ensure a regular steady supply, that then the plant is enabled to vegetate in a most vigorous and unusual manner. Thus when green manures, such as sea-weeds, buck-wheat, leaves of fern, &c., the most slowly decomposing of all vegetable manures, are applied to the roots of plants, the effects, according to chemical experiments, are excellent, and, as I have elsewhere observed, the farmer assures us that they are so. He tells us that all green manures cannot be employed in too fresh a state, —that the best corn is grown where the richest turf has preceded it,—and that where there is ploughed in the roots, stalks, and other remains of a good crop of red clover, that there an excellent crop of wheat may be expected, and that when a crop of buck-wheat is ploughed into the soil, that this is most advantageously done when the crop is coming into flower. The chemist again explains this without any difficulty. Davy and other chemists have shewn, that, when the flower is beginning to appear, then the plant contains the largest quantity of easily soluble and decomposable matters; and that, when these green plants are in this state buried in the soil, their fermentation is checked and gradual, so that their soluble or elastic matters are readily absorbed by the plants, and every portion of it becomes subservient to the demands of other crops. No scientific cultivator perhaps ever examined this question more accurately, or tried his experiments with more neatness, than the late excellent President of the London Horticultural Society, the lamented Knight of Downton; and these were the more valuable, from being instituted to ascertain the state of decomposition in which decaying vegetable substances could be employed most advantageously to afford food to living plants. This he clearly proved, however erroneous were his explanations of his own observations and discoveries: One of his experiments with a seedling plum-tree was very remarkable. He placed it in a garden pot, having previously filled the bottom of it with a mixture of the living leaves and roots of various grasses, covered over with a stratum of mould. The plant appeared above the surface of the ground in April, and, during its growth in the summer, was three times removed to larger pots in the greenhouse; in every case the bottom of them being filled as at first with living grasses, covered over with a layer of mould, and by the end of October, its roots occupied a space of about one-third of a square foot, it having then attained the extraordinary height of nine feet seven inches. This experiment was varied by Mr Knight in several ways; he drilled turnip-seed over rows manured with green fern leaves, and composed the produce with other rows of turnips by their side, manured with rich vegetable mould; and in all cases those which grew over the gradually fermenting green fern not only grew more rapidly than those treated in any other manner, but they were distinguished from all others in the same field, by their deep green colour. Now, when the gases of putrefaction are mixed with the roots of all growing crops, this is exactly the effect produced. The most foul stinking water, even when transparent, is ever the most grateful to plants; that from stagnant ditches which has always a peculiar taste from the carburetted hydrogen it contains, is excellent. Every gardener prefers that from ponds, however clear; the purer water from wells, he tells you, is very inferior, it is *too cold*; but then he confesses, that even warming it does not render it equal to that from stagnant places in its effects upon his plants,—so that in whichever way the experiment is made, there is no doubt of the value of these gases to the cultivator's crops, and he will readily therefore agree with Knight in the conclusion, that any given quantity of vegetable matter can generally be employed in its recent and organised state, with much more advantage than where it has been decomposed, "and no inconsiderable portion of its component parts have been dissipated and lost during the progress of the putrefactive fermentation."*

---

* Journal of the English Ag. Soc. vol. i. p. 253.

Aqueous Atmospheric Vapour.—The last substance ever present in the atmosphere in considerable proportions, and which bears a very important relation to the prosperity of the farmer's crop, is the aqueous vapour, without whose unvaried presence no commonly cultivated plant could flourish, and few exist at all. Providence, therefore, has ordained that this should be ever ready to meet the demands of vegetable life, and that its quantity should vary with the temperature, increase with the warmth when its pressure is most needed by the plant, and diminish in proportion as the air becomes cooler. Thus, at a temperature of 50°, supposing it to have a free communication with water, the atmosphere contains about 1–75th of its weight of vapour, but when its temperature is increased to 100°, then its proportion of water is increased to 1–21st of its weight; and this is the more important and the more beautiful arrangement, as Davy well observed in the economy of nature, because in very intense heats, and when the soil is dry, the life of plants is mainly, if not entirely, preserved by this absorbent power of their leaves, and the earth in which they grow, and happily this watery vapour is most abundant in the atmosphere when it is most needed for the purposes of life; when other sources of its supply are cut off, this is most copious. The amount, however, of the atmospheric vapour varies with the kind of wind. Those which have passed over warm seas contain more than those which have traversed extensive dry countries,—that which crosses the hot dry sands of Asia, and Northern Africa, is so dry that it burns as it were all the adjoining countries,—it is the cause of the Sirocco of Malta being so noxious,—and why the English farmer finds that an easterly wind, the driest of all our winds, is the least propitious to vegetation. He well knows, on the other hand, that the westerly or south-western breezes, the most watery of all winds, which come to his fields surcharged with all the vapours of the Atlantic, are precisely those which bring with them luxuriance to his crops, and clothe his woods with verdure.

---

* Trans. Hort. Soc. vol. i. p. 248.

The cultivator will derive many advantages from a careful investigation of the support yielded by the vapour of the atmosphere to his plants. He will perceive that its unvaried presence affords an additional reason why the air should be allowed to circulate freely through the well pulverized and loosened soil, to the roots of all growing crops; and let him, above all, avoid the very common erroneous conclusion, that the atmosphere is ever *dry*, that it no longer contains watery vapour, for the real fact is, he will find the very opposite to the common vulgar conclusion. The chemist's laborious investigations have clearly demonstrated, that, though the watery vapour varies in amount, yet it is never absent from the atmosphere, but that it happily always the more abounds where the cultivator's crops need its assistance most; it is then the most able to furnish the roots of his corn with all the moisture they need, and if it is unable to penetrate to them, the fault is not in the wise economy of Nature, but in the inattention of the cultivator, who is either too inattentive to see the advantages which he might thus freely derive, or too indolent to loosen the case-hardened soil, which prevents the entrance of the requisite supply of moisture. One of the causes of the unproductiveness of cold clayey adhesive soils, as Davy well remarked, is, that the seed is coated with matter impermeable to air. The farmer can convince himself of these facts by the simplest of all experiments. Let him merely use his rake or his hoe, on a portion of a bed of wheat, of turnips, or lettuces, or any other kind of crop, and let him in the driest weather merely keep this portion of soil loose by this gentle stirring, and he will find that instead of prejudicing his crop by *letting out the moisture*, as is often ignorantly supposed, that something is evidently *let into* the soil, for the portion thus tilled will be soon visibly increased in luxuriance by the mere manual labour thus bestowed; and in this experiment, which I have often tried, I am supposing that both the portions of the ground are equally free from weeds; that in every other respect the treatment of both the tilled and undisturbed portions of the experimental plot is exactly the same. To a very great extent some of the best of the English farmers have long found out these facts, and have acted upon the discovery. The horse hoe of the east and south of England, in the driest days of summer, may be seen at work in the large sandy turnip-fields of Norfolk and Suffolk with unvaried regularity, not for the mere destruction of weeds, for these are not the abounding tenants of such skilful farmers' lands, but for the chief and highly beneficial purpose of increasing the circulation of the gases and vapour of the air. "The longer I keep stirring the soil between my turnip drills," said Lord Leicester to me some years since, "in dry weather, the better the turnips grow."

The same uniform presence of aqueous vapour which marks the atmosphere in all times and seasons, in a still more remarkable degree distinguishes its constituent gases, for these never vary in amount in any times, or seasons, or countries. The atmospheric air has been analyzed, when obtained from the lowest valleys, and the tops of the highest mountains, in crowded cities, and in the open country, but its composition was always found to be the same, viz. nearly 21 per cent. of oxygen, and 79 of nitrogen, and from 1 part in 500 to 1 part in 800 of carbonic acid gas.

Such, then, are the principal matters contained in the atmosphere, or added to it by putrefaction, which influence the progress of vegetation. That there are other matters occasionally present in the air, which are in all probability grateful to vegetation, is very certain; our very senses tell us that there are clouds of smoke, which is a mixture of carburetted and sulphuretted hydrogen, soot, and vapour, hourly hovering over all large towns and cities, and which huge mass the winds disperse over the country. Of these the soot, and finely divided earthy matters with which it is combined, are very speedily deposited; it is one reason why the lands near to populous places are very commonly rich and fertile. That other gaseous matters also exist in the air in minute yet active proportions is very certain, though they are too subtile to allow the chemist to detect them—thus to such finely divided matters the physician attributes the progress of contagion—the chemical philosopher the aroma of flowers, and of many other substances. Certain diseases follow the course of particular winds, and the stones or fire-balls, and similar substances which have in all ages been seen to fall from the atmosphere, completely baffle the scientific conjectures of the meteorologist. With such speculations, however, the cultivator need not disturb himself: he, resting contented with the knowledge he possesses of the invaluable and essential powers of the known gases and vapour of the atmosphere to assist and sustain the growth of his crops, and adopting in consequence those improved modes of cultivation which that knowledge suggests, will patiently await the time when the future discoveries of science shall still farther enlarge his sphere of usefulness, by enabling him to draw forth those latent powers of production which, there is every reason to believe, yet remain hidden in the soil.

ON INSECTS MOST INJURIOUS TO VEGETABLES AND ANIMALS, AND THE MEANS BEST CALCULATED TO COUNTERACT THEIR RAVAGES.—NO. VII.

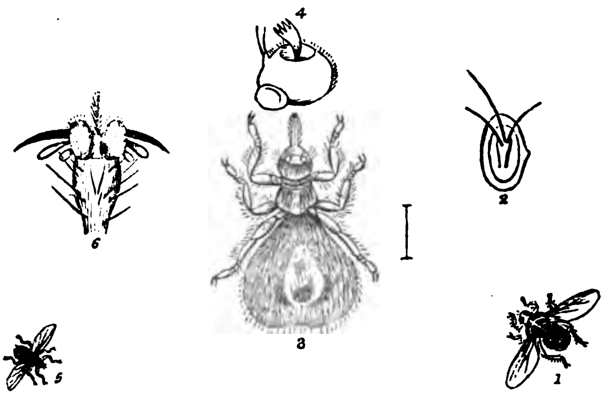
By James Duncan, M.W.S.

Our last paper on noxious insects, had reference to certain species of the Dipterous or two-winged order, which constantly live either *in* or *upon* our domesticated animals: among the latter there is another very singular group, the history of which we shall now proceed to lay before our readers.

The insects to which we refer, constitute the family Hippoboscidæ of systematic writers, and are known by the various English names of forest-flies, spider-flies, ticks, &c. The generality of authors include them among the Diptera, although they differ so considerably from these that it has been proposed to refer them to a separate order, under the name of Homaloptera. When wings exist, they are always two in number, but the greater part of the species are deprived of these organs, and, along with them, the balancers likewise disappear. In such a case, these insects have a pretty close affinity to certain apterous parasites of the Linnean genus Pediculus; but a close examination of their structure shews that they have a near relationship to the true Diptera, although deviating from them in several important particulars. Of these, the most remarkable is the circumstance of the young being retained within the body of the mother till it become a pupa; there being no instance among other two-winged flies of the period of gestation extending beyond the state of larva. This peculiarity has caused the hippoboscidæ to be termed *nymphiparous* or *pupiparous* insects. We shall describe three species of the group, as these may be said to be the only kinds which occasion us any inconvenience.

Forest-fly. (Hippobosca equina.) Donovan's Brit. Ins., vol. viii. pl. 261, fig. 1. *Leach in Wernerian Trans.* vol. ii. pl. 26. fig. 4-7. The genus Hippobosca may be known from others of the family by being provided with wings, having the head narrower than the thorax, the neck distinct, and the antennæ consisting of a single tubercular articulation, with three setæ at the extremity, of which the central one is longest. (*wood-cut No.* 1, *fig.* 2.) The species designated *equina* (which is the only one found in this country), is nearly four lines in length, the body flat, glossy, and of a coriaceous consistency; forehead shining brownish-yellow; eyes pitch-brown; thorax shining dark brown; the shoulders yellowish, and three spots of that colour before the scutellum, the central one of which is triangular; scutellum yellow in the centre, and marked with black at the sides; abdomen brownish-grey, and pubescent; legs reddish-yellow, the anterior pair unspotted, the thighs and tibiæ of the middle pair with a dark ring, the hinder pair with two: claws black; wings obscure brown. (*Wood-cut No.* 1, *fig.* 1.)

No. 1.



This insect is generally distributed throughout the country, but it is scarce in all the northern quarters, and does not seem to become abundant till we reach the wooded districts of the central counties of England. We have already mentioned, in a notice of that district, in what profusion it occurs in the New Forest;* it is not scarce in other parts of Hampshire; and it is said likewise to prevail in most of the adjacent counties, particularly where wood abounds. It flies with facility, but seldom appears on the wing except during bright sunshine. June, July, and August, are the months when it is in force; but, on the Continent, where it is very plentiful, particularly in the south of France, it appears earlier, and continues till the end of autumn. Its attacks are principally confined to horses, but, in lack of these, it sometimes assails oxen: if observed on other quadrupeds, as it is said occasionally to have been, the occurrence is quite accidental. It occasions no other harm to the horse than an extreme degree of irritation; and, if the flies are numerous, the animal is apt to become unmanageable. It insinuates itself, by a sideling crab-like motion, beneath the hair, and anchors itself to the skin by means of its large sharply-toothed claws. It also runs about among the roots of the hair with great ease, its motions creating an insufferable titillation, which is still further increased by the frequent insertion of its proboscis into the pores of the skin. The places to which it prefers attaching itself, are the under side of the belly, beneath the tail, and on the under side of the jaws. The insect is so flat, tough, and unyielding, that it is by no means easy to kill it by pressure ; it is, moreover, so tenacious of life, that Linnæus asserts, " Vivit, cursitat, immo coit, dempto licet capite." It is said, that horses which have been long accustomed to the attacks of these insects, ultimately become, in some measure, indifferent to them ; those which have never experienced this plague, which is enough to make some animals almost frantic, may be saved from it, according to M. Köllar, by the following application. Take of mineral earth 8 oz., and of lard 1 lb., and make them into a salve. Some of this salve is to be rubbed on here and there upon the hair, and worked in with a wisp of straw. After twenty-four hours, the salve is to be washed off with warm water, in which brown soap has been dissolved. Care must be taken for some days that the horse does not catch cold.*

---

* Quarterly Journal of Agriculture, &c., vol. x. p. 462.

We shall soon have occasion to describe certain kinds of flies, which, unlike the generality of insects, produce their young alive ; but the insect now under consideration, and its allies, are neither oviparous nor viviparous. The egg, when fecundated, descends from the ovarium into a kind of matrix, consisting of a large musculo-membranous bag, expressly designed for its reception, and analogous to the uterus of mammiferous animals. This cavity is at first small, but gradually dilates with the progress of gestation, till it ultimately presses aside the viscera, and fills the whole of the abdominal cavity. The egg is here hatched ; the larva passes its life, and is converted into a pupa, in the same receptacle. When the nymph or pupa is completely formed, it is then extruded from the body of the mother, in the form of a soft, white, oviform body. It soon changes its colour to brown, then to black, and, at the same time, the skin or covering becomes hard and strong, so much so as almost to resist the edge of a knife. That this solidity of texture, necessary to defend the inmate from injury, may not oppose an insurmountable obstacle to its exit, one extremity is provided with a kind of lid which can easily be pushed outwards.

---

* Treatise on Insects injurious to Gardeners, Foresters, and Farmers. By Vincent Köllar; translated by J. and M. Loudon. *London*, 1840.

There is one circumstance attending the phenomena of transformation which has often excited the surprise of observers, namely, that the disclosed body is as large, sometimes even larger, than the insect by which it is produced. "Any one who should declare," says the enlightened Reaumur, who was the first to explain the mode of propagation in these creatures, "that he had seen with his own eyes, a species of quadruped, the female of which, being equal in size to an ox or a camel, produced an animal as large as itself, and which was born perfect, undergoing no further growth, would be regarded as uttering the ravings of a maniac. Neither should we think him worthy of being listened to, if he told us that he had seen a large bird lay an egg of such enormous size, that it afterwards produced a bird of the same dimensions as the individual which laid the egg, and in every other respect similar to it. The marvel in regard to an oviparous animal, would be in no degree more credible than in regard to a viviparous one; it would even be less so, for the covering of the egg still further augments the mass supposed to be too large to be contained within the body of the mother. However small the bird might be to which this prodigy is attributed, were it even smaller than a humming-bird, the story would not appear less fabulous. The wonder is, in this case, no way increased or diminished by the smallness of the animal. Violence never fails to be done both to our fancy and reason, when we conceive an animal, at its birth, being as large as its father or mother. Yet this prodigy is exemplified in insects; in the kinds now under consideration, it holds true in all the extent which we have represented."* The truth is, that the abdomen is greatly distended during the period of gestation, and it immediately becomes collapsed after discharging its burden. The cocoon, moreover, seems to possess an expansive power, which comes into immediate effect at the moment it escapes from the body of the parent. These two considerations are quite sufficient to account for the anomaly to which Reaumur and other authors have adverted, but enough is still left to render this one of the most extraordinary cases of parturition with which we are acquainted.

Sheep Spider-fly, vulgarly *Ked or Keb* (*Melophagus ovinus.*) *Leach in Wern. Trans.* vol. ii. pl. xxvi., figs. 14 *and* 15. *Curtis' Brit. Entom*, vol. iii. 142. This generic group is apterous: the thorax is excavated in front, and the head capable of being retracted within it; antennæ nearly concealed in a cavity before the eyes, consisting of a large subglobose articulation, from which a flat membranous style arises, having four teeth at the apex (*Woodcut No.* 1. *fig.* 4); claws large and strong, recurved at the base. The species which lives on the sheep is of a dull rust-red colour on the head and thorax; the abdomen is large, inflated, and semitransparent, of an obscure yellow colour, with a somewhat heart-shaped rusty spot on each side, and another less distinctly marked, forming a kind of triangle towards the base; legs ochre-yellow; tarsi rust-red; claws black. The whole body covered with short rigid hairs. Length about two lines. (*Woodcut No.* 1, *fig.* 3.)

---

* Memoires pour servir, &c., tom. vi.

The metamorphoses and general history of this insect, correspond, in every important particular, to what has just been related of the Forest-fly. Viewed in relation to its structure, the antennæ are very remarkable, and they may be considered, as well as those of Hippobosca equina, as having no analogues among other insects, unless it be those of the Dragon-flies (*Libellulidæ*), to which, however, they do not bear a very close resemblance. They are extremely well adapted to the habits of their owner, being almost retractile within the head, and thus causing no impediment to its movements, among a substance where an organ of any length would speedily become entangled. The eyes, also, are small and deeply sunk in the head, the power of distant vision not being required by a creature incapable of flight, and living in such a situation. Its attacks are confined to the sheep, where it lurks among the wool, and often proves a great annoyance to the animal. In certain places, and under particular circumstances, it becomes very abundant, and occurs nearly at all seasons of the year. It must not be confounded with another insect enemy to sheep, the Acarus, to which it bears some resemblance by being apterous.* Sheep are seldom at any period, or in any condition, wholly free from the Melophagus, but its attacks are always most vigorous on hoggs, and such as are in an unhealthy state. The irritation caused by the insertion of the proboscis, and strongly hooked claws, into the skin, is so great, that the animal tries to obtain relief by tearing the wool with its teeth, wherever the affected part is within reach of the mouth. This propensity occasionally gives rise to a singular accident. When the neck is much bent in the effort to reach the place irritated, the teeth sometimes become fastened in the wool so firmly, that the animal is unable to extricate them, and soon loses the power of its neck. If relief is not afforded, it necessarily perishes in a short time. In such a case, shepherds say that the sheep dies by being *bridled*.

---

* In the short paragraph which he allots to the consideration of the insect enemies of sheep, Professor Low, evidently speaking of the Melophagus, calls it a species of *Aphis!* an insect with which it has scarcely any attribute in common. See his Elements of Practical Agriculture, p. 586.

Like all the insects of this family, the Melophagus is extremely tenacious of life; it may be squeezed till the whole substance seems to have left it, and yet recover; and even when cut asunder by the shears of the clipper, the portion of the body to which the legs are attached, runs about for awhile as if nothing serious had occurred. The celebrated Ray tells us, that it will exist in a fleece twelve months after it is shorn. But there are various substances, the application of which speedily discomfit and destroy it. One of the best remedies against this pest, as well as several others of a kindred nature, is the process of smearing, for almost all the materials commonly employed in that operation are fatal to it. Spirit of tar, tobacco liquor, corrosive sublimate, and many other substances of a similar kind, have been found effectual. Even less active remedies, such as urine and lime-water, may be applied with advantage. "In order to remove these noxious vermin," says Dr Dickson, "it has been recommended to separate the wool, and to wash the diseased spots two or three times, or oftener if necessary, with a liquid preparation, consisting of one ounce of cream of tartar, and a quarter of a pound of bay-salt (both being powdered and sifted) and one ounce of corrosive sublimate, mixed together in two quarts of soft water: or four pounds of soft soap and two pounds of arsenic, may be steeped in thirty gallons of water, and the animal immersed in the infusion, the head being carefully kept above water, and the sheep sheltered from rain for one or two days. The wool must be closely pressed, and the liquor that runs off be caught in a tub or other vessel for future use. Of this application it is sufficient to state, that it is approved of and used by those eminent agriculturists, Lord Somerville, and T. W. Coke, Esq. of

Holkham Hall, in Norfolk. The proportion above specified is sufficient to bathe forty lambs." A similar bath is strongly recommended by a writer in the Farmer's Magazine for November 1828; but besides the arsenic, the only other ingredients he employs are soft-soap and purified potash.

There is a pretty numerous race of insects belonging to this family, which are parasitical on various kinds of birds; but, however interesting these may be to the general naturalist, a particular description of them does not accord with our present purpose, which is limited to the notice of such kinds as are more or less injurious to our domestic animals. One of the parasites alluded to (*Caterina Hirundinis*) which is of large dimensions considering the size of the animal which it infests, is found on the common House-Swallow. Another (*Anaptera pallida*) lives on the Swift; and many others of the feathered race have similar assailants. One of the more common it may be desirable to describe as an example, as it frequents poultry and game birds, and is often, moreover, confounded with one or other of the species described above, which confine their attentions to quadrupeds.

Bird-Spider fly (*Ornithomyia avicularia*), *Leach*, *Wern. Trans.* pl. 25, fig. 4, 5. This genus is more nearly related to Hippobosca than to Melophagus. The species are winged; the antennæ hirsute and lamelliform; three ocelli or simple eyes on the vertex of the head; wings nearly equally broad throughout, the longitudinal nerves strongly marked, and extending to the posterior edge; claws very strong, with two lobed appendages near the base of each. (*Woodcut No.* 1, *fig.* 6.) The species above referred to is scarcely half the size of the Forest-fly; of a greenish-yellow colour; eyes pitch-brown; thorax blackish at the sides, and having a yellow line down the middle; wings smoke-brown, the nerves still darker; legs pubescent. (*Woodcut No.* 1, *fig.* 5.)

It infests various kinds of birds, particularly the Grouse and Black-cock. A nearly allied species (*O. viridis*) lives on the Crow, Magpie, Jay, &c.

However troublesome the Hippoboscidæ may be to the various animals which they inhabit, they can in no case be considered as directly endangering their lives. It may be admitted, however, in regard to the sheep parasite, that when it occurs in large numbers (and when it does so it is generally in combination with other hurtful influences, which enable every individual cause of disease to act with greater momentum), it may not unfrequently tend to impair the health of the animal in no inconsiderable degree. But we now come to the consideration of a tribe of two-winged flies, from which the invaluable quadruped just alluded to sustains the greatest injuries, and which, if not prevented by the watchful care of the shepherd, speedily occasion its death.

That almost every kind of dead animal matter, when exposed to the air during warm weather, soon becomes the residence of numerous small worms, termed maggots or mawks, is a matter of daily observation. Before the mode of generation in insects was rightly understood, or their habits investigated with any degree of attention, these maggots were supposed to be the offspring of putrefaction, or to originate in some spontaneous agency. They are now well known to be produced by flies in the ordinary process of generation. But the parent flies not only commit their progeny to dead substances, but likewise to the bodies of living animals, and the sheep is most frequently selected for the purpose. There is a considerable amount of species, belonging to more than one genus (known by the general English name of *blow-flies* or *flesh-flies*) which seem to prefer a living nidus for their young; but as a notice of all these would lead too much into descriptive details, we shall confine our observations to the kinds which appear to be most detrimental.

The ordinary process by which the evil is occasioned may be briefly described. The female fly oviposits on the skin of the sheep wherever a somewhat naked spot can be obtained; or failing that, attaches her eggs to the wool. The places most frequently selected, are near the root of the tail, the flanks, and the neck. The maggots are hatched from these eggs with great rapidity; the period, however, varying with the degree of temperature. When that is high, the young are disclosed in three or four hours, and probably in every case within twenty-four hours. In some instances, the young are deposited ready hatched; in other words, certain of the species are viviparous, the larvæ being disclosed within the body of the mother. In either case, the larvæ speedily find their way to the flesh, on which they immediately begin to feed. In their general form and appearance, these larvæ are all very similar to each other. They are soft and whitish, without feet, thickest at the hinder extremity, which is truncated, and gradually tapering to the other extremity which terminates almost in a point. The latter is provided with two hooked bodies with which the larva divides its food. Their voracity is very great, and their growth proportionably rapid. In a day they increase to nearly double their original dimensions; and, on weighing them, Redi found, that in twenty-four hours they increase their weight upwards of two-hundred fold! They complete their entire growth in a few days, when they allow themselves to drop to the ground, into which they burrow a short way, and there undergo the usual metamorphoses.

Sheep *struck with the fly*, to use the shepherd's phrase, soon shew symptoms of distress, which cannot easily be misunderstood. They almost constantly hang down their heads, sometimes turning them a little to one side, as if listening; shake the tail with a quick jerking motion; run rapidly from one place to another, and, in doing so, at times stop suddenly, and stamp with their fore feet. Occasionally they attempt to bite the part affected, and tear the wool near it with their mouth. When they have been severely affected for some time, and their strength beginning to fail, they lie close upon the ground till death put an end to their sufferings. That their sufferings are very great must be obvious to every one who has seen a sheep overrun with these vermin. We have seen them moving languidly about, with several large openings in various parts of the body, disclosing the viscera in numerous places, the hapless victims being literally eaten alive. When the larvæ are very numerous, and excited to great activity by a calm sultry state of the weather, the animal attacked may be destroyed in two days; a much shorter period suffices to inflict wounds which may prove incurable. Commonly, however, the progress of destruction is not so rapid; animals severely infested often survive for a week, and even drag out their miserable existence for a much longer time.

The localities in which these flies are most numerous and pernicious, are low lying meadows, surrounded with woods, and particularly the deep dells so frequent in Scotland, where the rays of the sun are, as it were, concentrated, and a free circulation of air prevented by numerous and dense patches both of trees and underwood. Indeed, sheep pasturing on a hill side, and exposed to the unobstructed action of the air, seldom suffer to any extent from the evil in question. The flies commence their depredations as soon as the warmth of summer sets in, become more numerous and active as the summer advances, and attain their maximum in the end of autumn. It is during the warm calm days in the end of August, and in September, that the shepherd requires to be most on the watch against this insidious foe.

But before proceeding further with our remarks on the subject it will be desirable, by means of brief descriptions, to make the reader acquainted with the external appearance and distinctive marks of the objects to which they refer. All that we shall notice are referable to the three genera Sarcophaga, Musca, and Anthomyia, each of which is of considerable extent, comprehending altogether about 150 species, many of which, however, are very rare. These three genera may be thus briefly distinguished :—

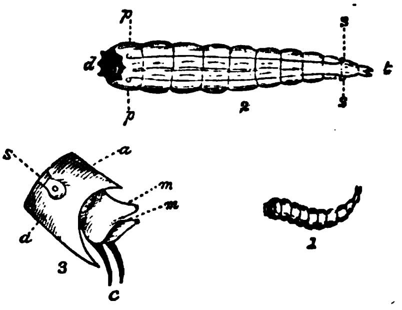
Wings with a transverse nerve at the apex, { seta of the antennæ naked at the apex.—SARCOPHAGA.
{ ———————— plumose to the apex.—MUSCA.
Wings without a transverse nerve at the apex.—ANTHOMYIA.

SARCOPHAGA (from σαϱξ, *flesh*, and φαγω *I eat*) has the antennæ incumbent ; the third or terminal joint oblong, prismatic, the base with a seta, which is plumose below and naked at the tip ; eyes placed at a considerable distance from each other in both sexes. The species are of a narrower and more elongate form than the Muscæ, and the prevailing colours are changeable, grey varied with dark lines.

S. Carnaria. Musca carnaria, Linn. *Mus. vivipara major*, De Geer, vi. pl. iii. fig. 5–18. *Chequered Blow-fly.* Somewhat larger and more elongated in shape than the common blue-bottle fly; general colour changeable grey ; thorax with black longitudinal lines ; abdomen covered with black quadrate spots, which give it a tessellated appearance : eyes red ; legs black ; body pretty thickly beset with rather strong hairs. Wings clear and nearly hyaline, the base slightly tinged with obscure yellow; wing-scales large and white.

This insect is found in considerable plenty throughout Britain, appearing pretty early in the spring, generally in April. It is habitually what is called viviparous, that is, producing its young alive. This term, however, must not be understood in precisely the same sense as when applied to vertebrate animals, for the young are not developed like the embryos in them, in a uterus by means of a placenta, but come from eggs hatched in the body of the mother, so that the fly may be said with more propriety to be *ovo-viviparous*.

No 2.



We shall figure and describe one of the larvæ of this species as an example; those of the other flesh-flies are so like it in every respect, that it will be unnecessary to treat of them individually. Its general form has been already noticed. When full grown it is scarcely half an inch in length, (*Wood-cut No.* 2, *fig.* 1.) the head small and membranous, (*Wood-cut No.* 2, *fig.* 2, a magnified view of the same larva; *t*, the head), having two fleshy prominences above, with a small nipple-shaped knob, (*fig.* 3, *m*, *m*), so that they bear a perfect resemblance to small mammæ. Beneath these mammiferous protuberances are two strong black moveable hooks, *c*, placed by the side of each other, which are attached to a black piece, divided into two branches, situate within the head and two first rings of the body, appearing through the transparent skin which covers them (*fig.* 3, *a*, *a*, first segment of the body; *s*, one of the anterior stigmata). These hooks, which, according to De Geer, resemble the claws of a cat, can be retracted, not only within the head, but into the segments of the body lying immediately behind it. They are not pushed outwards, unless when the larva walks, or drags itself along the plane of position, which it does by their assistance, as they lay hold of the smallest inequalities. But the principal use of these hooks is to tear off, and separate the fibres of the flesh on which the creature feeds. The whole head, it may be remarked, is capable of being drawn back within the first segment of the body. The last segment of the body is, as it were, cut across. It has a large cavity posteriorly, which is surrounded with many prominent points which can be lengthened or shortened at pleasure (fig. 2, *d*). Within this cavity, the principal stigmata or breathing pores are situate; and when the larva is immersed, as it often is, in putrescent matter, the extremity is completely closed over them, and their minute apertures thus kept from being filled up. When the extremity comes in contact with the air, the covering is immediately withdrawn, and a fresh supply inhaled, that element being as essential to the welfare of this creature as to animals of larger growth. Two large tracheæ or air-vessels may be seen running along each side of the body, terminating at both ends in spiracles or breathing-holes (fig. 2, *p p s s*). The intestinal canal in the centre is likewise visible through the transparent integuments.

On opening a pregnant female which had been dead for some time, De Geer found that the young larvæ had devoured the whole of the interior of the abdomen; but they were unable to penetrate the skin, and must have perished there, had they not been set free by a Cæsarian operation.

Musca Cæsar. Linn. Harris's Expos. of Eng. Ins., pl. XXV, fig. 23.—In muscá, the antennæ are incumbent; the third joint elongate, obtuse, compressed in a prismatic form, and having a plumose dorsal seta at the base; the wings spreading, and provided with a transverse nerve at the apex. The body of the muscæ are rather short and thick, the outline of the abdomen approaching to triangular. The inner margins of the eyes closely approach each other behind, particularly in the males. *M. Cæsar* may be readily known by its brilliant green hue, which has a silvery play of colour when seen in certain lights; forehead silvery; eyes and proboscis reddish-brown; thorax with strong scattered hairs; those on the abdomen smaller and less rigid; wings clear, the nervures brownish at the base; wing-scales large and white; legs black and pubescent; length, about four and a half lines.

A most abundant fly in all parts of the country.

M. Vomitoria. Linn. Harris' Expos. of Eng. Ins., pl. xxv, fig. 18. *Shaw's Gen. Zool.*, pl. 107. *Musca carnivora, Fabr. Musca carnaria cærulea, De Geer*, vi. 20.—This is the large and very common blue-bottle or blow-fly, which so frequently finds its way into our houses, where it soon intimates its presence by its loud buzzing noise. It is one of the largest species of the genus. The colour is bluish-black; forehead golden-yellow; thorax with three pale longitudinal lines; the abdomen nearly steel-blue, with a whitish play of colour, and darker rays, which make the surface appear tessellated; legs lack. This is the species, of which Linnæus affirmed that ree individuals could devour the carcass of a horse as soon a lion. There is no doubt that we must impute to it a large are of the injury our flocks sustain from this tribe of inects.

Anthomyia Lardaria. Meigen Zweig., Ins., v. 83; *Harris's Expos. of Eng. Ins.*, pl. xxxvi, fig. 52.—Anthomyia (from ανθος *a flower*, and μυια *a fly*) is an extensive genus, a large proportion of our most common flies being referable to it. The plume of the antennæ is sometimes feathered, at other times naked; but, besides other less obvious differences, the genus may be recognised by the distinctive mark indicated above, viz. the want of a transverse nerve at the apex of the wing. *A. lardaria* is rather more than half the size of *M. vomitoria*; of a bluish-black colour; the thorax with longitudinal lines; abdomen slightly tessellated; eyes pubescent; legs black. It is very common in low sheltered woods, and is doubtless often associated with the others in preying on living subjects. There is another member of this genus, *A. meteorica*, which is often very troublesome to horses by collecting in clouds round their heads in warm weather, and flitting about with a kind of jerkng flight, and occasionally lighting on the nostrils and lips of he animal, to his no small annoyance. The larvæ of this fly ave been sometimes found in the human stomach, having, no doubt, been accidentally swallowed along with some kind of food.

The loss sustained by stock-farmers from the attacks of these flies, and others of similar propensities, is often very great; and, of late years, the evil seems to have been rather on the increase in some parts of the country. "This disease," says an intelligent writer in an early part of this Journal, "for the last five or six years, has been rapidly spreading in the West Highlands, producing alarming effects and considerable loss to the agriculturist. On five farms in the neighbourhood of Loch Vennachar and Loch Lomond, where I had an opportunity of making observations, the number of sheep amounted to 4000; of these, 550 were affected during the summer; 195 died; and, although 355 of those survived, it was long before many of them completely recovered. On all these farms, there was the greatest attention bestowed to prevent or cure the attacks of the 'mawks' (larvæ). It was remarked to me by the proprietors, that this season (1827), their attacks had increased in frequency and severity; that they had appeared in situations where they were formerly unknown, and on the high grounds where the sheep used to be driven for safety."

There can be no doubt whatever that the flies will deposite their eggs or larvæ on a sheep when it is in a perfectly healthy condition; this is proved by too many circumstances to admit of being called in question. At the same time it seems probable, from the observations of shepherds, among others the Ettrick Shepherd,* that such as are in a certain state or condition of body are selected in preference. When a sheep is affected with diarrhœa, or when the excrement and perspiration acquire a peculiarly rancid and putrid smell, probably occasioned by some particular kind of food, nothing could adapt it better to the taste of these insects, which are speedily attracted, from distances which appear to us incredible, by the emanation of the tainted air. A colony of larvæ having effected a settlement, the putrid smell is still further increased by their operations, which is so agreeable to the sensations of their companions, that if not timely prevented, another colony is certain soon to succeed.†

It is asserted by the writer formerly alluded to, and he affirms that his opinion is corroborated by the shepherds, that

---

* Shepherd's Guide, being a practical treatise on the Diseases of Sheep, by James Hogg, p. 106.

† We are assured that it is possible, when near sheep so circumstanced, to distinguish by the smell those likely to be soon attacked. If it be true, as affirmed by Price in his work on Sheep, "that a looker's dog, when properly trained, the moment he enters a field in which are any sheep struck by the fly, instantly singles out the diseased animals, and runs up to them, as much as to say they ought to be caught;" this wonderful instance of sagacity is doubtless to be ascribed to the same cause.

M. Cæsar is generally the first to make the attack. When the larvæ of this species have established themselves, and rendered the body of the animal a more suitable nidus, *M. Vomitoria* succeeds, and being a much larger insect, the consumption of the victim goes on at an accelerated pace. He states that *S. Carnaria* appeared to be rare in the Highlands; but throughout the south of Scotland and England it occurs in great plenty, and is doubtless an active agent in the greater number of such cases, enjoying, as it does, the advantage of bringing forth its young ready hatched, in consequence of which they escape many of the casualties to which eggs are subject.

Perhaps the principal reason why the larvæ of these flies are found on sheep more frequently than on other animals, is owing to the great ease with which they, or the eggs which produce them, can be deposited among the wool, by which they are so protected, that it is almost impossible for the animal to get rid of them by rubbing itself or any other means. But numerous instances are on record of their attacking other animals; and even man himself, under peculiar circumstances, may be assailed. A most remarkable case of this nature is related by Kirby and Spence, of an old pauper, named John Page, who subsisted by begging, and was in the habit of depositing the surplus meat which he received from the charitable betwixt his shirt and skin. Having become unwell, and laid himself down in a field, while he had a considerable stock of provision stored in this way, the meat became putrid, and was struck by flies; the maggots devoured the flesh, and speedily began to prey on the living substance, and in a short time so shockingly mangled the body of the wretched man, that he survived the dressing of his wounds (which presented a most loathsome spectacle) only a few hours.

The great object of the shepherd ought to be, to prevent the flies, if possible, from depositing their eggs or larvæ. For this purpose he will require to be continually on the watch, particularly in the close of autumn, and in the sheltered localities which the insects most frequent. Such sheep as are affected with the disorder formerly alluded to, or are in a weakly condition from other causes, claim his principal attention, as they are likely to become the first victims. All sores or abraded portions of the skin, which might attract the flies, should be covered with some kind of ointment, spirit of tar, or some similar application, which, by emitting a strong scent, will prevent the approach of the flies. A portion might also be applied with advantage to different parts of the body, that the scent may be more generally diffused. As tar has commonly a cauterizing effect when applied to an abraded surface, many prefer as a liniment melted butter mixed with flour of sulphur, which is said to be a very effectual preservative. A liquid composed of the following ingredients is recommended as equally efficacious.

Take of Arsenic, finely pounded, one pound.
Potash, twelve ounces.
Common yellow Soap, six ounces.
Rain or river water, thirty gallons.

Boil these together for fifteen minutes; and apply the liquid in dry weather, by means of a teapot, or vessel of similar form, rubbing it in till the fleece be pretty well saturated. This composition is said to be in no degree injurious to the wool. It cleans and dries the offensive perspiration of the sheep, and destroys the smell caused by the dew in the mornings, or by damp hot weather. In most situations, one dressing in July and another in August will suffice; but as the expense is trifling, and the process simple, it may be better to apply it more frequently, especially in low and damp situations.* When much evil is apprehended, and circumstances admit of it without much inconvenience, it is an excellent preservative to drive the flock, during the heat of the day, to some elevated pasture; the higher it is, the less likely is it to be frequented by carnivorous flies.

When the maggots have broken the skin, and fairly established themselves, no application for destroying them similar to the above should be trusted to. The wool must be shorn off around the lacerated parts, and the larvæ completely cleared away with a knife, or other similar instrument, the operation being performed as gently as possible, to avoid further irritating the already inflamed and therefore highly sensitive tissue. If any blisters appear on the skin, they should be opened, as they will be found either to contain maggots or some morbid secretion produced by a sympathetic connection with the parts more directly affected. The larvæ being carefully removed, the subsequent treatment must be regulated by the nature and extent of the wound. If not of large size, some of the substances formerly mentioned may be applied, or others of a less caustic nature, such as soap and urine, in the first instance, and afterwards the common mixture of tar and butter. A large opening will require further care; it should be covered by a piece of linen cloth, or soft leather, attached by some adhesive substance, the labia of the wound being drawn towards each other as much as possible, to aid the efforts of the vis medicatrix in effecting a cure. Cases sometimes occur in which it may be of advantage to sew the lips of the wound together.

---

* See a paper on this subject by Mr Mather, in the 24th No. of this Journal.

Various plans have been recommended for diminishing the numbers of these voracious insects, but none of them are likely to be attended with much benefit. Wherever a suitable pabulum is to be found, they find their way to it from very great distances, under the guidance of a peculiar sense or instinct, of which we can form no accurate conception; and it is therefore obvious that any method for destroying them would be very ineffectual, unless practised simultaneously over a pretty extensive district. But it may be of advantage to remove carcasses or putrid animal matter from pasture lands and their vicinity, as we thus take away the attraction to that particular spot, and destroy what may prove a nursery of enemies. When the flies are already numerous in a limited locality, some benefit may arise from exposing the carcass of some animal, for the express purpose of inducing them to intrust their progeny to it, and when the larvæ appear, sinking it in water till they are destroyed. The same carcass may in this way be employed as a trap several times in succession.

ON CLAY OR PLUG DRAINING.

There is a kind of draining which has been for several years extensively and successfully practised near Gloucester and Cheltenham, called clay-draining, or by some plug-draining, which is by no means generally known elsewhere. It is suited to all land that has a sufficient descent, that is pretty clear of stone, gravel, and sand, and that has strong clay for a subsoil. It is better adapted to grass than to ploughed land. It is more certain, and the cost is less, than of most other drains,—fourpence for a lug of six yards being the usual price for completing it. It requires no cart-work, and is exceedingly durable. Some of the tools can only be applied to this purpose, but they are not expensive. They are somewhat difficult to be understood from description, and they would seem awkward at first in the hands of a man not used to them, but these obstacles may be overcome by a little perseverance and a fair trial, and it is probable that these drains will supersede all that are now used on such soils as are suited to them.

This system is slightly mentioned in the Library of Useful Knowledge, British Husbandry, vol. i. p. 457, et seq. It is also treated of more at large in this Journal, vol. iv. p. 501, in a paper written by D. S. Evans, Esq. of Cheltenham.* This gentleman speaks of it so fully and so sensibly, that nothing more need be said about it, had it not been for one or two slight errors and omissions, which must make it impossible for any one who has not seen the work done, even if he had the tools in his hands, to use them with effect from the description given. It will be the object of this paper to remedy these defects which have thus unfortunately crept in.

From reading page 503, it would seem that the bit and the grafting-iron were the same tool. This is not so. The *grafting-tool*, as it is usually called here, is generally used. It is the common strong circular spade used by all labourers in digging canals, and the like, in the very heaviest parts of their work, where the pick-axe is not necessary. It is the most convenient spade known for this work, but if it be not at hand, the work can be done with any other. The bitting-iron, as we call it, is accurately described in fig. 1, and so is the suter or blocks, except that the latter are generally now made of pieces of wood a foot long, and that the number of them is different, for the whole instrument is from five to six or seven feet long. Two other tools are necessary, viz. the tray and the rammer; descriptions of both these will be found in the sequel.

---

* The reader will please to refer to the wood-cuts of Mr Evans's paper.—EDITOR.

The following tools, then, are used in clay-draining:—

1. A common spade.

2. A grafting tool or circular spade used in digging canals and the like, in the heaviest work for which a pick-axe is not wanted. Should this not be at hand, the work can be done with any spade. Neither of these need description.

3. The bitting-iron can be used for draining only. It consists of a bar of iron, with a stepping-bar fixed to one side of it, and a handle like that of a spade at the upper end. From the stepping-bar to the bottom is about 17 inches. On the *same side of the bar as the stepping-bar*, not on the opposite, as represented in the cut at page 503, and at the bottom, the bit is fixed, which is a thin bit of steel, or of iron edged with steel, of a triangular shape, and ground sharp all round, and measures 6 inches from the acute angle at the apex to the centre of the base, the base being about 6 inches in width. The bar is 2 inches wide at the bottom, and is continued of the same width to about 6 inches above the bit, so that the bar and the bit form a right angle in which the clay rests, and is lifted out of the drain, after it has been cut out. The length from the stepping-bar to the handle is usually about the same as in a common spade. Some men who are left-handed wish to have the bit and the stepping-bar on the other side of the bar.

4. The tray is a piece of iron of the shape of a cylinder, split through longitudinally, about a foot long, with a wooden handle, the iron being 2 inches wide. The handle is fixed to

it like that of an axe, and is about 5 feet long. It is used for lifting any pieces of clay out of the trench which may have been left by the bitting-iron, or may otherwise have fallen in.

5. The rammer is a bit of hard wood through which another piece of wood is put at the top for a handle. It is about 4 inches thick, and 8 wide, at the bottom. It is used for ramming the clay, and afterwards the earth, upon the blocks in the trench.

6. The suter or blocks. Each block, intended for a *common* drain, must be made of some hard wood, 12 inches long, 9 deep, 2 wide at the bottom, and 4 wide at the top. The number of blocks may vary according to the fancy of the drainer. About five or six is the usual number. They may be fastened together with any kind of hinge or joint. To the centre of that block which is intended to go foremost, a chain about 4 feet long is to be very firmly fixed, having a large link at the other end, through which a wooden lever 6 or 7 feet long, and pointed with iron, is passed for the purpose of getting a firm hold in the bottom of the trench, and forcing the blocks forwards, after the clay has been rammed down upon them.

The whole, then, will appear thus: those blocks which are to be used for making the head drains must be an inch deeper and an inch wider than those above described. The use of the joints is to admit of a drain being crooked should it be necessary; in all other respects a straight piece of wood of the proper length would be preferable. For each separate ramming, the blocks should be so drawn forward that all *except the last* should be seen. No pieces of earth can then be left in the water-way.

These tools are used in this manner. The first operation is to cut a head drain beginning from the outlet, into which all the other drains will fall. For the first two or three yards this should be dug like a common tile drain, because it is always desirable, though perhaps not absolutely necessary, that for this length it should be tiled, to make the mouth of it less liable to be stopped up from the treading of cattle or other causes. The clay drain should be 2 feet deep, the bottom of course level and clean. Supposing it (as is usually the case) to go up a furrow, the turf must be taken off 5 or 6 inches deep with a common spade to the distance of about a foot on each side of it, and carefully laid by. The drainer then makes a trench with his grafting tool, both sides sloping inwards. Another drainer follows him with the bitting-iron. He places the bit of the iron with the point towards him, and its stem at such an angle with the ground-line that, on being forced down with his foot, the same slope made in the trench with the grafting-tool on the right side, shall be continued. The bitting-iron is then forced down with his foot, and immediately withdrawn and reversed, and used on the other side of the drain. It is there forced down as deep as on the opposite side, and the piece of clay being now separated by the bit from the left side, as it had been in the first cut from the right, will lean against the back or stem of the tool, and may easily be lifted out, so that the sections of the drain will appear in the shape of a trapezium.

To this operation all the skill of the drainer is requisite, and if it be not correctly performed, it is not possible that the drain can succeed. The angle at which the bitting iron proceeds, as well as the depth to which he drives it with his foot, are of the utmost consequence,—indeed the one depends in great measure on the other, for the art is to get the depth right at the bottom, and to make the sides fit the blocks. Considerable accuracy of eye and hand are necessary, as well as no small share of bodily strength; but it will not be difficult to find men who will very shortly acquire it.

Having proceeded thus far with the trench, the next thing is to clear the bottom out with the tray, so that no loose pieces of earth or clay shall be in it to impede the blocks which must now be put in. The most adhesive clay or soil of any kind that has been dug out, must be thrown in upon them, and *very well* rammed down *by a strong man*, then that which is less and still less again adhesive must be thrown in and rammed down on the top of the blocks, till nothing but the vegetable mould and the turf are left, which may then be returned when there is more leisure. The blocks are then drawn forwards by sticking the lever into the bottom of the trench, and forcing them on, till all except the last can be seen, and then a new ramming takes place as before, and so on. *None of the soil must be carried away. All must be returned, and so rammed into the trench, that when the vegetable mould and the turf shall be returned, the rib on the top of the trench shall not be more than two inches, or at most two and a half high,* which will be a pretty sure criterion of the work being well done, without the eye of the master having been constantly upon it in progress. Thus a drain or water-way has been formed in a stiff substratum, not likely to be reached by the atmosphere—deeper than mice or moles ever go,* and secured on the top by a wedge of clay, or other strong soil, rammed together *more firmly than it was in its original state.*

If, in any very dry summer, the land should contract very much, it is possible that the trench may become again a little wider, and let the wedge down a little lower, but to the bottom it never can go, and the water-way under it must always be sufficiently large, *inasmuch as the bulk of the blocks is much greater than that of the rib left on the drain,* and the bottom of the wedge much wider than the bottom of the drain. The head drain being meant to carry off the water collected in all the other drains, should be at least an inch wider and an inch higher than they are, and, of course, it will require other and larger blocks. The common drains should meet it in all cases at nearly, but not quite at right angles, for if the angle be acute, it may be washed away by the water, and so matter may be deposited, by which the drain may be filled up. When it has been proceeded with to the first furrow or other place where a common drain is to fall into it, the common drain should be begun before the blocks for the head drain shall have been withdrawn. The small blocks should be placed against the large ones, *and both should be rammed together at the junction.* The small ones should be then withdrawn to be ready to begin the next common drain; the common drains may be proceeded with more at leisure. Care should be taken that no drain should ever be over-loaded, that more water than will fill it should never be forced into it; and wherever there is danger of this, another head drain with communications between the two should be put alongside the first. If the drain become too full, it is possible that the clay wedge may be lifted out, but though this may frequently happen without damage, yet it is too great a risk to run without some good end being in view.

---

* Rabbits are the only animals likely to injure it. If a stop, which may be easily contrived with two or three bits of strong copper wire, were put between the second and third tiles, they could not get in, or if they did, they could be easily pulled out at the outlet.

These drains should go straight up and down every hill, and should be at given distances apart; they are usually put in every furrow, but the propriety of this must depend on the adhesiveness of the soil, as well as on the distance of each furrow from the next. Sometimes one in every other furrow will do, and sometimes it will be right to disregard furrows altogether. Six yards apart, more or less, is a fair average distance. Experience will best teach this. By going straight up and down the hills, the drains will cross every stratum where it crops out, and so be ready to carry off the water that may be contained in either of them, and thus they are more sure than those recommended by Mr Elkington. It is very true that *where his drains catch the water and carry it off*, none can do better, but there are instances in abundance where they have failed. We find water rise at a particular spot, but by what direction under the ground it came there, we cannot see. On considering the slope, the dip, and nature of the strata, and all other things, we often think the water *descended* there, and we put our drain above it in the hope of cutting it off; whereas, from some invisible interruption, the water rises there perpendicularly, or by some other direction, and our drain is useless. As the clay drain, if properly done, will be sure of keeping the surface dry, it cannot be of the least consequence how the water came there.

It cannot but have been observed that clay drains, being cut through the clay where it can never have been disturbed, and at such a depth as shall be out of the reach of frost and of vermin, are likely to last very long, because it is not easy to imagine any thing that will affect them. The firmness of the wedge of clay of which their tops are composed, must effectually secure them against all external injuries. Some have supposed that if the tops of the blocks were circular, it would be even more secure, as the top of the drain would then be an arch, but this is fallacious. It is *a single wedge driven till it can go no farther*, and therefore capable of supporting *any weight that can be placed upon it.* It is *the body* of the wedge, and *not the shape of the lowest part of it*, that affords the strength. Indeed one of its greatest defects is, that, if it be carried through ground where the fall is trifling, and therefore the drain is often *full* of water *to the very top*, *the bottom of the wedge* has been known in time to give way, to drop down, and so to fill up the drain in the course of time; and in this respect it is certainly not so good as the tile drain. It should have, if possible, such a declivity, that the velocity of the water in passing through it should carry away any little accumulation that may form, but it should be remembered that if such should form, it will be carried out of the clay drain *quite as easily as out of tiles.* Bad workmanship will prevent any drain from succeeding, but it will not affect clay-drains more than others, nor are they more likely than others to be slighted with or without discovery. Their cost (fourpence the lug of six yards) together with there being no team work, is decidedly in their favour, and should they fail in any part, it is not difficult to repair them, if a stone or solid wooden top can be contrived for a few feet after it is necessary to withdraw the blocks. A new drain may easily be made by the side, and in aid of an old one. Roots of trees will stop this as well as any other kind of drain, and for this reason, it may sometimes be advisable to put a few tiles under hedges, &c. that they may be more easily cleared out when this should occur. It would also be advisable to put tiles *(but always with flat soles under them)* through any bed of sand or gravel that may occur. It is believed that, with fair play, clay drains will last an immense number of years.

It has been said (and truly) that they are more fit for pasture than for arable land. The plough will of course disturb the rammed earth at the top of the wedge, and should it ever be necessary to alter the shape of the lands (to make them more or less rounded or the like) it may go deep enough to disturb so much of the wedge, that the remainder may yield to the foot of a horse or the wheel of a waggon. It will therefore be safer to make them deeper through ploughed land, which will be done by going a few inches deeper with the grafting tool, but this may possibly make it less efficacious. If the clay be moderately porous it need not be feared.

This principle of draining has been found to answer well on the tops of the Gloucestershire hills, where there is much stone in layers from one to three inches thick. The cost is of course more, and the plan of proceeding different; but it will do equally well on grass and on arable land, and is likely to last to the most remote period of time. The bitting-iron will in most cases be useless, and the blocks in all. The turf or top-soil is thrown on one side with any common spade of the country, and the trench is continued to the necessary depth with a pick-axe, only keeping it as narrow as possible. Of course, the sides and the bottom will be very rough, but it must, as in the clay, be kept as much to a wedge shape as it can be. Stones with flat beds are then put side by side by the hand, and three or four *together*, and side by side are dropped into the trench, so that they cannot drop to the bottom, but shall hang suspended. The interstices are then filled with smaller stones placed by hand, and the whole is rammed down as firmly as possible. The water-way is thus left clear below, which may be called the wedge of stones, and nothing can hurt it. The top-soil is of course thrown in again. These drains are far preferable to those made by filling trenches with broken stones, and probably not more expensive.

But to return to the clay drains first mentioned. The gang should consist of four men. An inferior labourer goes first and takes off the turf. Another inferior labourer follows him with the grafting-tool, or it may be done with a common spade. A very good drainer goes next with the bitting-iron, and a powerful man follows him with the rammer, or one very good man may be substituted for the two first, but he would be hard worked. They will go on pretty much one as fast as the other, and will earn good wages. If the job were sufficiently extensive to employ two gangs, seven men would be plenty for both.

ON THE COST OF STOCKING A SMALL FARM.

By Mr William Murray, Sliock, Aberdeenshire.

The following statement shews the amount of capital required for stocking a farm of one hundred Scots acres, in this part of the country, exclusive of houses and dykes. The land is supposed to carry five quarters per acre in a five-course rotation of cropping, and capable of growing green crop. Beginning at Whitsunday 1836, the stocking of the said farm will consist as under:—

Kitchen furniture; dairy utensils; and servant's bedding and bed, ...	£22	10	0
4 Draught horses at L.25 each; harness for do. at L.3 each, ...	112	0	0
1 Riding-pony, L.10; a snaffle-bridle, 10s.; 1 riding-saddle, L.3, 10s.	14	0	0
4 Close-bottomed carts with hay-tops and cart-ropes, at L.9, 10s. each, . . .	38	0	0
4 Long carts for driving lime and grain, at L.2, 2s. each, ...	8	8	0
4 Full-mounted harrows at L.1 each; 4 traillers for do. 1s. 6d. each, ...	4	6	0
2 Grass-seed harrows, made to cover 12 feet, full-mounted, ...	1	0	0
4 Pairs of full-mounted haims, neck-straps, breast-straps, at 7s. per pair, ...	1	8	0
5 Stall-collars at 4s. 6d. each, chains and sinkers to each, at 8d.	1	5	10
2 Iron ploughs, with yokes, swingletrees, and plough-rins, at L.4, 4s. each, ...	8	8	0
1 Drill-plough, with cutters and double mould-boards, &c.	3	10	0
3 Curry-combs of forged iron, 1s. each; 3 brushes at 2s. each, -	0	9	0
1 Corn-chest for stable, 20s.; five hay-racks, 10s.; 2 stable-forks, 2s.	1	12	0
2 Fixed lanterns, one for stable and one for mill-barn, at 4s. 6d. each, ...	0	9	0
2 Water-pails for stable, at 2s. 6d. each; a shoe-picker, 6d.	0	5	6
5 Well-bred Aberdeenshire cows, at L.10 each; 5 calves, at L.1 each, ...	55	0	0
1 Well-bred Aberdeenshire bull, two-year-old, L.10,	10	0	0
Carry forward.	£282	11	4

Brought forward,	£282	11	4
5 Two-year-old stots, at L.5, 10s. each; 5 one-year-old stots, at L.3, 10s. each,	45	0	0
4 Pigs, at 7s. each, L.1, 8s.; 2 dozen poultry, at 1s. each, L.1, 4s.,	2	12	0
1 Turnip-cane, and 1 probe for cattle,	0	15	0
16 Iron fastenings for cows and feeding cattle, 24s.; 5 calve's fastenings, 5s.,	1	9	0
Forestalls and dividing trevises for cows, feeding cattle and calves,	3	0	0
2 Box-barrows, 30s.; 2 peat-barrows, 16s.; 2 peat-spades, 6s.,	2	12	0
3 Spades, No. 5, at 4s. 6d. each; 2 shovels, at 4s. 6d. each,	1	2	6
3 Grapes, at 3s. 6d. each; 2 small do. for spreading dung into drills, at 2s. 6d. each,	0	15	6
2 Ladders, 16 feet long, 2 do. 12 feet, of Spey fir, with ash steps,	4	10	0
1 Sledge, shod with iron, 20s.; a pick, 7s.; 1 tramp-pick, 12s.	1	19	0
1 Bushel and streak, 9s.; a peck, 2s.; a weighing-beam, 18s.; a barrel, 8s.; boards, 2s. 6d.,	1	19	6
100 Imperial weights, 16s. 8d.; 2 wooden scoops for filling corn, 5s.	1	1	8
A bear-hash, 15s.; 20 yards of canvas for a barn-sheet, at 6d. per yard, 10s.,	1	5	0
2 Hay-rakes, 5s.; and 6 forks for corn and hay, 14s.; a corn-rake, iron-toothed, 12s.,	1	11	0
1 Axe, 5s.; 1 nail-hammer, 2s. 6d.; 1 cross-cut saw, 5s.,	0	12	6
3 Straw-racks for cattle, 10s. 6d.; a rance or turn-key, 10s.; an oil-flask, 2s.,	1	2	6
32 lb. of hog's lard for cart grease, at 5d. per lb. 13s. 4d.; a grease-tup, 1s.; polling-shears, 1s. 6d.,	0	15	10
A large trough for washing potatoes, bottomed with iron splits,	0	15	0
5 Corn-troughs, at 2s. 6d. each; a bait-tub, 5s.; 1 hay-knife, 3s.,	1	0	6
40 Half-quarter bags, at 1s. 10d. each; 6 baskets for planting and gathering potatoes, 1s. each,	3	19	4
3 Seed-riddles, one for oats, 3s. 6d., one for bear, 4s., one for grass-seed, 4s. 6d.; one range, 4s. 6d.,	0	16	6
2 Turnip-sculls, 2s.; 2 turnip-picks, 3s. 6d.; a dung-drag, 3s.,	0	8	6
A plane table for squaring land, 2s. 6d.; 6 straighting-poles, iron shod, 1s. each,	0	8	6
Carry forward,	£362	2	8

Brought forward,	£362	2	8			
A Stone-roller, full mounted, L.2, 16s.; 6 turnip-hoes, full mounted, 1s. each,	3	2	0			
3 Full-mounted scythes, with emery boards and scythe-stones, at 7s. each,	1	1	0			
120 Gallon boiler, of Carron metal, full mounted, grates, damper, &c., built in,	5	5	0			
1 Hand-lantern, with small lamp, 2s., an iron lamp for kitchen, 1s. 8d.,	0	3	8			
A thrashing-mill, L.45; barn-fanners, L.4; turnip seed-sower, L.3, 10s.,	52	10	0			
				£424	4	4
Interest on the above, including risk, tear, and wear, at 10 per cent,				42	8	4½
April 1836.						
140 lb. Clover-seeds, at 9d. per lb.; 30 bushels of perennial ryegrass, at 4s. per bushel,	£11	5	0			
50 lb. Turnip-seeds for 20 acres, at 9d. per lb.; and garden-seeds and cabbage-plants, 9s. 6d.	2	7	0			
20 Acres for turnips, land-rent; 3 ploughings and 3 harrowings, at L.2, 4s. per acre,	44	0	0			
Dung and bones for 20 acres, at L.3, per acre,	60	0	0			
20 Acres of new grass, say 160 stone per acre, at 6d. per stone,	80	0	0			
20 Acres of second year's grass for pasture, at 35s. per acre,	35	0	0			
4 Weeks' hay for 5 horses, laying down turnips, and driving lime, 1½ stone each per day, at 8d. per stone,	7	0	0			
26 Weeks' corn for 4 horses, 2 feeds each per day, 18 qrs. and 4 pks., at 18s. per quarter,	16	7	7			
26 Weeks' corn for a pony, 2 qrs. and 5 bushels, at 18s. per quarter,	2	7	3			
A meal-girnal, with a division for containing 50 bolls of meal,	5	5	0			
3 Men-servants a-year, at L.10, each; a woman and a boy a-year, at L.5 each,	40	0	0			
6½ Bolls of meal to each man per year, or two pecks to each per week, at 14s. per boll,	13	13	0			
9¾ Do. to the woman and boy per year, or 1½ peck to each per week, at 14s. per do.,	6	16	6			
1 pint of sweet milk to each per day, at 2d. per pint per year,	15	4	2			
2 Men for harvest, at L.2 each; and 2 women for do., at L.1, 10s. each,	7	0	0			
Carry forward,	£346	5	6	£466	12	8½

Brought forward,	£346	5	6	£466	12	8½
6 Weeks' meal and milk for 2 men and 2 women in harvest,	3	4	9			
6 Weeks' small-beer for 7 hands in harvest, a pint each per day, at 1¾d. per pint,	3	7	4			
240 Quarter's straw, at 6s. per quarter,	60	0	0			
100 Bolls of lime-shells per annum, at 2s. per boll,	15	0	0			
Smith-work and iron per annum,	6	10	0			
Carpenter, wright, and nails per annum,	3	0	0			
Day-labourers for moss, turnip, and hay, per year,	5	0	0			
Soap for washing servants' bedding, and giving clean sheets per month,	0	3	6			
	£442	11	1			
Deduct for harvesting the out-going tenant's crop 1836,	18	0	0			
				424	11	1
April 1837.						
Outlay during the second summer half-year before a return from the farm :—						
25 Quarters of seed oats, at 20s. per quarter, for 30 acres,	£25	0	0			
7 Quarters of seed bear, at 26s. per quarter, for 10 acres,	9	2	0			
140 lb. of clover-seeds, at 9d.; 30 bushels of perennial ryegrass, at 4s. per bushel,	11	5	0			
50 lb. of turnip-seeds, at 9d.; garden-seeds and cabbage-plants, 9s. 6d.,	2	7	0			
120 Bushels of bones or dung for 6 acres, at L.3 per acre,	18	0	0			
3 Men-servants for 6 months, at L.5 each; meal for do., 6¾ bolls, at 14s. per boll,	21	16	6			
A woman and a boy for 6 months, at L.2, 10s. each; 14 bolls and 14 pecks meal to do., 14s. per boll,	8	8	3			
2 Men in harvest, at L.2 each; 2 women per do. at L.1, 10s. each,	7	0	0			
Meal for do., and small beer for 7 hands 6 weeks in harvest,	5	4	1			
				108	2	10
Interest on capital paid out for 1 year and 6 months, at 3 per cent. on L.532 : 13 : 11,				15	19	7
				£1015	6	2½

The following statement shews the probable return from the said farm, not reckoning any value on straw or hay; the straw going for the dung, and two-thirds of the new grass for maintaining the horses and black cattle; the remaining third for hay.

Crop of 1837.

30 Acres in oats, averaging 5 qrs. per acre, at 20s. per quarter, ...	£150	0	0			
10 Acres in bear, averaging 5 qrs. per acre, at 26s. per quarter, ...	65	0	0			
10 Three and four year-old stots, averaging 35 Dutch stones each, at 6s. per stone, . . .	105	0	0			
4 Pigs, 7 Dutch stones each, at 4s. 6d. per stone, .	6	6	0			
4 Cwt. of Cheese, at 30s. per cwt., L.6; eggs and poultry, L.4, ...	10	0	0			
5 Cwt. of butter, at 70s. per cwt. . . .	17	10	0			
				£353	16	0
From which sum of L.353, 16s., deduct as under, viz.						
10 Quarters of oats for horse-corn per annum, at 18s. per quarter, ...	9	0	0			
25 Quarters of seed oats, per annum, at 20s. per quarter, ...	25	0	0			
7 Quarters of seed bear, per annum, at 26s. per quarter, ...	9	2	0			
32 Bolls of meal, per household, per annum, at 14s. per boll, ...	22	8	0			
3½ Quarters of salt, per household, per annum; cattle and hay, at 1s. 2d. per bushel per annum, .	1	12	8			
4 Pigs, 7s. each; and 5 one-year-old stots, at L.3, 10s. each per annum, ...	18	18	0			
3 Men-servants a-year, at L.10 each; and small beer, L.4, 10s. per annum, ...	34	10	0			
A Woman and a boy, at L.5 each per annum, .	10	0	0			
2 Men and 2 women in harvest, ...	7	0	0			
Blacksmith for farm-work and horse-shoeing, iron, &c., per annum, ...	6	10	0			
Carpenter, wright, with nails and wood for the stack-yard, per annum, ...	3	10	0			
Day-labourers for moss, turnip, and hay, per annum, ...	5	0	0			
Coals, grease, light, taxes, tolls, and expenses of marketing farm produce, per annum, .	12	5	0			
120 Bushels of bones or dung for 6 acres, at L.3 per acre per annum, ...	18	0	0			
150 Bolls of lime-shells, at 2s. per boll per annum,	15	0	0			
140 lb. of clover-seeds, 50 lb. turnip-seeds, at 9d. per lb. per annum, ...	7	2	6			
5 Bushels of perennial ryegrass, on average 4s. per bushel, ...	3	0	0			
Carry forward,	£207	18	2	£353	16	0

	£	s.	d.	£	s.	d.
Brought forward,	£207	18	2	£353	16	0
A veterinary surgeon with medicine, for horse and black cattle, per annum, . . .	1	12	0			
Saddler, keeping horse's harness in repair, and oil per annum, ...	0	17	6			
Insurance on houses, sink and decay on do.; insurance on dead and live stock per annum, .	6	0	0			
Interest on capital, including risk, tear, and wear, as before stated, ...	58	7	11½			
				274	15	7½
				£79	0	4½

The balance of L.79 : 0 : 4½, is all that remains for rent. No allowance is here made for the farmer's superintendance; and what he requires of the farm product for his own use, is charged at market price.

If the farmer were to be allowed six per cent. for capital, for risk, tear, and wear, which is certainly the lowest calculation that could be made on a speculation of the kind, the balance for rent would only be L.63 : 0 : 9½.

THE AGRICULTURIST'S NOTE-BOOK.—NO. XI.

Remarks on Dr Ratier's Method of Making Coffee.—The short article on "*A Method of Making Coffee,*" by Dr Ratier, No. 46, p. 289 of this Journal, must not be passed over without particular notice. The practice recommended is very specious, and appears to promise great improvement. As we have put it to the test of severe and reiterated experiments, and thus being prepared to shew to what extent the writer has succeeded or failed to make good his pretensions, shall, without hesitation, take *The Method* to pieces, and compare it in detail with our own experiments, thereby enabling the reader to investigate for himself, and draw his own conclusion with the least possible risk of waste or trouble.

We admire coffee, not only for its peculiar and delicious odour and flavour,—not as a substitute for tea, either at the morning or afternoon repast,—but as the best of all beverages at and after dinner.

Not that, for one moment, would we wish to advocate the cause of anti-christian tee-totalism,—anti-christian inasmuch as it falsifies the doctrine which teaches that "every creature is good, and none to be refused if it be received with thanksgiving;" and also as being at utter variance with the precept "Let no one judge you in meat *or in drink*,"—but inasmuch as we are verily persuaded that, were any one to attach himself to the practice of taking generous, clear coffee, without sugar or milk, in lieu of beer, or vinous liquor—*as a habit*—he would quickly be aware of having added to his enjoyments.

Spirituous liquors are stimulants; and, generally speaking, do not confer strength or promote health. Stimulants are occasionally useful or even vitally necessary; but if habitually indulged in, they become, as the experience of all times has proved, a source of debility and malady.

But this subject has been already treated most ably, and we therefore refrain from any other remark than the following, that, coffee, to be enjoyed, and to prove a successful rival of spirits, must be good,—perfectly roasted, though not in the least burnt,—and finally prepared in a way which will convert it into a beverage far different from the nauseous trash which is usually served, at the inns or coffee-houses, to the traveller who has the misfortune to substitute it for the herb of China.

Dr Ratier pretends to effect all, and more than all, we have alluded to, in the preparation of coffee. He speaks of *strength*,—fragrance of odour,—delightful perfume,—superbness of *colour*,—and perfection of taste. Let us examine his pretensions.

"Take four ounces of good coffee properly roasted and ground; dilute it with two glasses of cold water with a spoon." Sufficiently indefinite are these initial directions. However, the best plantation, Java or Mocha, if of a clear chestnut-brown colour, answers well, and from any, or all of them, a good extract can be obtained, provided the coffee be reduced to a powder nearly as fine as that of Scotch snuff: too fine it cannot be. Four ounces will produce nearly four pints of infusion of a fair or sufficient strength. But what is to be understood by "two glasses of cold water?" Are they wine glasses or tumblers? A wine-glass of common size will contain two ounces of water—a tumbler about four times as much; but four ounces of water will not reduce *two ounces* of finely ground coffee to what is called "pap." This was proved in the first experiment, when, after the materials used in those proportions had stood together one night, scarcely a table spoonful of a deep brown infusion could be strained off.

Three careful trials led to these conclusions,—1. That eight ounces of cold water were not more than sufficient to extract the chief part of the colour and flavour of two ounces of coffee. 2. That this first extract, so obtained, did not exceed four fluid ounces, which, as respects odour and flavour, did by no means equal the infusion obtained by the common process of boiling. 3. That a second quantity of eight ounces (*i.e.* half a pint) of cold water, added to the dregs, produced a weaker infusion, but one which still abounded in flavour.

It is asserted that cold water "will draw from coffee *all that can* be obtained from it;" and that the residuum then "treated with boiling water, gave nothing but a water slightly tinted with yellow, and devoid of odour and flavour."

Truth constrains us to meet these assertions with a flat denial. Three digestions of coffee in cold water, each twice repeated, produced, it is true, an infusion, which, when boiled up with an equal quantity of water, was strong enough; but the dregs of two ounces yielded to water brought to a boil on them, and kept in a state of simmering for a minute or two, a liquor of a brown colour, certainly not fragrant, but abounding with the bitter principle. This infusion was comparatively weak, and retained little of the fine aroma of the berries; yet it was not very unlike that poor bitter stuff which is but too often passed off as coffee.

We hope our readers will repeat the experiments carefully, and take nothing for granted till they have acquired a practical knowledge from well-observed facts.

The machinery is simple: it comprises two wide-necked pint-bottles, a pint-glass or earthenware funnel, and a piece of cambric or linen tied on the latter, so as to form a round, hollow bag, deep enough to receive all the moistened coffee without coming into contact with the glass near the pipe of the funnel. The fluid will pass foul at the first, and should be returned over the pulp till it become clear. When it ceases to drop, the vessel should be tapped with the finger now and then; and when nothing more will pass, the coffee must be replaced by a spoon in its first bottle, there to be acted upon during a second twenty-four hours by another portion of cold water.

Thrice have we made our dinner coffee by the foregoing process; and, with every disposition to hope the best, we have been constrained to admit, that the economy of material was less than none; for, from two ounces, we could in no instance procure a beverage equal in flavour or apparent strength to that obtained from one and a quarter ounce, by a minute's simple boiling in a common tin coffee-pot.

There is also a great loss of time; and any want of tact or adroitness in passing the materials to and from the funnel, will cause a loss, either by spilling or pouring the liquor over the side of the vessel.

The process by cold infusion appears to have been sanctioned, if not originated, by the Emperor Napoleon. He liked his coffee to be so prepared; and, as "de gustibus non est disputandum," there may be some who will prefer it to the infusion made by boiling. No difficulty can exist in extracting much colour and flavour by cold water. It is not, therefore, the process itself as to its feasibility that we dispute, but its uselessness and extravagance. In fact, loss of time, delay, and expense of material, are incurred to prepare that which can be better done by simpler means.

One ounce and a quarter of well-roasted, finely-ground good coffee, and six little shreds of isinglass, put into a common coffee-pot, with a pint of water either cold or hot, but in either case brought to boiling heat, and made to *simmer* till the great bubble (which is thus always formed) break, will produce a beverage which shall assuredly compete with the water-coffee of Dr Ratier in all its superlatives of "delightful perfume, superb colour, and perfect taste."

After all, it is a question, whether the best coffee be not prepared by simple percolation; for experience has shewn that, if any given quantity of finely-ground coffee be placed on the grating of a percolator, and boiling water be poured over so as to pass slowly through it, all the colour and flavour worth obtaining will be extracted by two waters. These instruments are manufactured in various ways and of several metals. Some are furnished with simple straining bags; others with double cylinders of metal to fit one within the other: the principle is the same; but all of them that we have inspected or employed, have the one-crying defect—that the *receiving vessel*, whatever be its form, is *invariably made of some metal.* Silver and gold (the former particularly) are the least defective, inasmuch as they are more free from alloy than some of the lower metals; but they are only within the reach of the opulent, and, at the best, are not quite pure. "*Queen's metal*," as it is termed, is a compound,—so is block-tin. The consequence is, that a voltaic action is induced, which decomposes the coffee, destroys, or at least reduces its flavour, and degrades its colour.

A tea-pot-shaped percolator, furnished with every requisite appendage by which perfectly bright coffee could be made at the table, as readily as tea, and in as short a time, was seen, day after day, so to decompose strong coffee, in the space of little more than ten minutes, as to reduce its colour from that of brown stout to the pale tint of table beer, and, in proportion, to deprive it of taste and odour.

Percolators will never answer, or continue to give general satisfaction, till they be prepared with receiving vessels of porcelain, stoneware, or some material of the same nature,—metals will not do. And indeed, in every case, whether the coffee be boiled and fined with isinglass according to common custom, or prepared by the simple percolation of boiling water, the fluid should always be transferred to some kind of earthen vessel.

These facts are deduced from repeated trials and long experience,—they will support the most rigid examination; and it is cordially hoped, that they will so be tested far and wide, till a utensil be called for, and generally manufactured, which shall combine all the requisite qualifications to prepare the beverage with facility, and to secure it when made from deterioration.

Considerations of Moorband Pan.—I feel much interested in the remarks that have been made more than once on the substance with the above singular name, that sounds so strange to English ears,—"Moorband-Pan!"—it is droll, "but what's in a name"—the reality is all, and that is what—it appears to me—requires elucidation.

I go as far as any one can, with the writer of the observations which commence at page 272 of the 46th No. of this Journal, in all that refers to the great advantages of thorough and effective under draining; and the editor will, I believe, justify the assertion when he recollects sundry pleasant subjects which occurred during a very delightful but unexpected interview, which occurred not many months ago.

I then mentioned to him what I now allude to, as connected with this inquiry, that, while inspecting a subsoil-plough which had been introduced by a very influential agriculturist in Buckinghamshire; the person who directed our attention to the new instrument, observed that it worked extremely well *after good drainage*, but that it never could obviate the necessity of draining where *that* really existed. A case, perhaps, never occurred wherein drainage, or some operation tantamount to it, did any injury; for though it is admitted (as is the case in my own grounds) that there are spots, or even districts, situated upon chalk or gravel, where an absolute flood of water would pass away in a few hours, leaving the surface-soil in a free working condition; still even in the shallow soils of various parts of Kent reposing on a solid rock of chalk, a breaking up of the rock to the depth of a foot or two will improve the fertility of the upper stratum, by gradually receiving manuring matters, and in this way creating vegetative earth.*

The expense is all that can form a subject of doubt or debate; but, in as far as regards a bad substratum retentive of water, draining is the only cure; and the cost is a secondary consideration.

---

* Even the common practice of placing an inch stratum of broken pots at the bottom of a garden pot, is an example of the effects of good drainage, for not only does water circulate and pass off freely, but the roots run, and absolutely revel, among the fragments.

But what I would learn is, the nature of the "*Pan*" as a chemical combination—what are its constituents? We are informed that it consists "of alumine, silex, and hydrate of iron;" but the proportions of the two former are not expressed. They, however, are the chief components of loams and clays, the texture of which depends upon the relative quantities in which the two may be combined; both are innocent, though susceptible of much improvement by aëration. The peccant quality of the pan must therefore be sought in the iron, and hereupon we are taught that it exists in the form of "a *hydrate.*" Now, instead of being enlightened by this exposition, I must acknowledge that I find myself utterly perplexed; for I cannot comprehend how any *hydrate*, a chemical *hydrate* in the proper acceptation of the term, can be found coexistent with alumine and silex. If by hydrate is meant a *solution of iron in water*, then we arrive at tangible ground; but if an *hydrated oxide* be contemplated, we must have recourse to principles, and attend to the minutiæ of facts.

A solution of iron in its metallic form, to say nothing of its nonentity, would not be a *hydrate*. But a solution of a *salt* of iron, that is of iron dissolved in some acid, is a thing of very common occurrence. The proto-sulphate which bears the familiar names of *copperas* and salt of steel, is observable in the vicinity of the collieries. It is pumped up in a state of aqueous solution from the mines, and takes its passage along the neighbouring ditches and water-courses, depositing on the banks abundance of brown or rusty oxide of iron. This water has a highly chalybeate taste, and its effects on vegetation would be found very destructive. If the pan contain iron in *this form*, its poisonous quality can be no longer doubtful, and exposure to air presents itself as the simplest remedy.

But to return to *hydrate of iron;* the writer of a previous article in No. 45 attempts to define the condition of the iron in which it is found to exist in moorband-pan. See the paragraphs, p. 133, commencing "There are three known oxides of iron." Certainly much confusion exists in the statements therein made; there being only *two* known oxides of iron,—first the *protoxide*,

In which, 1 proportional of iron .	= 28,	or per cent.	77
Combines with 1 proportional of oxygen	= 8,	or per cent.	23
	36		100

and second, the per or sesqui oxide, wherein

1 proportional of iron . .	= 28,	or per cent.	70
Combines with 1½ of oxygen .	= 12,	or per cent.	30
	40		100

If the *pro*toxide exist in a soil, and become really dissolved *in water*, a sort of hydrate is formed: though, even then, the term, in a chemical sense, is inadmissible; a true *hydrate* requires the water to be fixed and solidified with the *base* (and, for example, we may cite slaked lime, which is, *bona fide*, pure lime combined with a certain quantity of water in the condition of a dry powder).

But this is not the view of the writer when he asserts that "oxide of iron *takes* the oxygen from the *water*, and leaves the hydrogen to escape;" for, according to it, the decomposition of *water*, and the consequent fixation of a larger dose of *oxygen* by the oxide, brings that oxide into the state of a *hydrate!* Or to place the absurdity in another position, we might say, "Here is a given quantity of iron in a low state of oxidizement, and it is, in contact with water, a fluid which is known to be constituted of oxygen and hydrogen; this oxide, by '*its great affinity for oxygen*,' decomposes the water, takes to itself its oxygen, and drives off, or at least, sets free its hydrogen, and thus becomes a *hydrate*, not a peroxide; it has first destroyed the water, and then has united itself to it; it has absorbed all the oxygen, and thus has not left any water remaining wherewith it could combine; nevertheless it is converted into a *hydrate* by the *absorption* of water."

It appears to me, to speak the honest truth, that, chemically, there is no such thing as a true, natural hydrate of iron, and that, whenever we detect the metal in fertile soil, we find it in the condition of an oxide. On the contrary, whenever (as in the "pan" or other submerged unaërated substances) we perceive good and healthy earths to be rendered poisonous by an irony constituent, we may reasonably expect the presence of a soluble salt of iron—which salt will be, and is, decomposed in course of time, when exposed to the influence of air, rain, and solar light.

Referring to page 134, we find that the writer has not overlooked the solutions of salts of iron, but does not consider them to be the noxious constituents of the pan. His opinion of the agency of animal manures is embarrassing. *Sulphur* may exist in these substances, but not, I conceive, in volumes sufficient to produce the effect which he contemplates; and what is meant by the " impregnated water of the hydrate," is by no means apparent. Sulphuret of iron is said to be " insoluble, and therefore inoffensive;" admitting this to be the fact, it is erroneous to say that oxygen decomposes it, and " frees the sulphate of iron."

When oxygen acts upon *sulphuret* of iron (as for instance the native pyrites in the coal mines), it *converts* the sulphur into sulphuric acid, which dissolves the iron and *forms* the protosulphate of iron called green vitriol, the solution of which is always noxious to vegetation; but when oxygen acts upon iron, it invariably produces one or other of the oxides, but never the *hydrate*; the thing is impossible.

To conclude this subject by reference to chemical authorities, I will cite from Brande's Manual of Chemistry, the only two passages which will be required to throw any light upon the question of hydrates of iron; the reader must draw his own conclusions as to their relevancy to the subject of the present notice:—

> " HYDRATED PROTOXIDE OF IRON.—When the protosalts of iron are decomposed by caustic potassa, a precipitate falls, which at the first moment is white, but immediately becomes grey, then green and blue, and lastly yellow, in consequence of absorbing oxygen. The white precipitate is probably an *hydrated protoxide of iron.* When boiled with water, it becomes black, the hydrate not being a permanent compound at a boiling heat."
>
> " When a solution of iron in nitromuriatic acid is precipitated by an alkali, a bulky brown *hydrated peroxide of iron* falls, which, when dried, assumes a deeper colour, and is an *anhydrous peroxide.*"

I fear that we have not made a step in advance; that, as to the hydrate, we are quite out at sea, and for the present must conclude that the iron in the pan is perhaps in the condition of a sulphuret, and by decomposing water produces a soluble neutral salt, which is destructive of vegetable life, and can be rendered innoxious only by exposure to light and air.

Preserving Potatoes : By Mr Robert Lymburn, nurseryman, Kilmarnock.—After reading the digest of the papers on preserving potatoes for *domestic use*, in the 45th Number of the Society's Transactions, I am induced to trouble my readers with a few thoughts on the subject. Mr Milburn's plan I consider the best, so far as it goes, for that purpose; the nourishment deposited for the future food of the embryo or bud, whether in tubers or seeds, assumes first the state of gum or mucilage, and in the subsequent process of ripening is converted into sugar and starch, called also farina or flour ; mucilage is easily converted into soluble food, for the nourishment and development of the young embryo, and hence the superior quickness in germination of unripe tubers or seeds, less of the essential agents in vegetation, heat, and moisture, being requisites, but they are from the same cause more difficult to keep. The superiorly ripened tuber or seed contains more starch, the particles of which (separately surrounded by a shell) are much more difficult of solution, and require much more heat and moisture before they can again become soluble food. It must also be clear, that the potatoes containing most farina or flour is fittest for domestic use, and consequently, the ripe superior to the unripe. To Mr Millburn's plan, I would, however, add, that of destroying the vitality of the tuber when *domestic use* alone is proposed ; and for this purpose, if they are heated in a malt kiln till most of the moisture is evaporated, it may be sufficiently done without injuring but rather improving the quality of the flour, and they will afterwards keep as long as necessary in a dry loft without much trouble. Beech-mast is collected in the woods in England, and being very often in a damp state, and the weak seeds being often washed out by swimming them, and scooping off the refuse, the good seed that subsides, or the damp seed though not thus treated, requires to be dried for the purpose of being fit to carry, and is put on a kiln ; it is often, however, heated too long, and if the season is moderately dry, has been often known to lie in the ground, after being a season in the nursery beds, without germinating through the whole season, though perfectly sound and fit for eating, but destitute of vitality. Rye-grass seed and other seeds are often spoiled from the same cause, and I have often wondered that the same process has not been resorted to in keeping potatoes. The unripe potato, however, as Mr Aitken justly observes, is best adapted for seed, though I should be of opinion this might be carried too far. Nature ripens the seed into a state fit for preservation, the very fitness for preservation making it more difficult of germination. If too unripe and weak it will not keep, and if much ripened it is not so easily excited, and in seasons when there is not heat and moisture sufficient, the unripe tuber being more easily excited succeeds best; but if the season is not deficient in the heat and moisture needful for converting the farina into soluble food, we will find few complaints of failures, unless from accidental causes, of bad seed, injured by heating, or rather improper keeping, and badly prepared ground. Mr Aitken's directions as to both of these are excellent, and if attended to, failures would seldom be heard of. I would be afraid, however, if the stems are cut green as he advises, and the roots left in the ground, the tubers would push out stems, which, drawing on the food deposited already for next season, would weaken the tubers too much, and would rather advise exposing them at the time of taking them up, by spreading them on the ground till they become green, which will greatly increase their thickness of skin and vigour, as every body must know who has ever planted those growing on the surface. He also justly observes, great value ought to be attached to raising new varieties from seed, the superior vigour in newly raised seedling varieties of any plant being very conspicuous, and has long been matter of observation to those concerned in the raising of seedling flowers and fruits; but the efforts of these would appear gradually, and cannot account for the very great failures of former years. A year or two cannot deteriorate a plant so rapidly as has been observed, and some other cause peculiar to those periods, must be found in the seasons themselves. Now, certainly the great drought prevailing exactly at the time of planting, and thus depriving the sets of moisture, one of the most necessary agents in germination, is the most apparent. Dry weather at the time of preparing the ground is excellent, and after the potatoes are above ground the roots have come into action; but drought at the time germination is going on (unless carefully guarded against by preparing the sets in the way Mr Aitken advises, or by pulverising the ground and excluding the drought, by a covering of moist earth), must cause the cut sets to perish. What but drought has caused the same sets taken from the same lot, and planted at the same time with the plough, on clayey land become a complete failure, while the same sets planted in the same day, and the ground well broken with the spade, have done well without any deficiency, as we have ourselves had experience in those seasons? In preparing sets for planting, or seeds for sowing, quick lime spread amongst them at the time they are preparing by moisture, will be found greatly to benefit them. The lime being deprived of its carbonic acid in the act of burning, assists greatly in reducing the starch into a soluble food, by extracting carbon, developing heat, &c., as more particularly explained in an essay by myself, published in Loudon's Gardener's Magazine, in the spring of 1838.

On Acclimating Cattle: By Dr James Smith, Louisiana.—In bringing horses or oxen from the climate of Kentucky or Tenessee to that of Louisiana, it is well known that the process of acclimating must take place, but this process in the horse appears to be accomplished without much danger, while in the ox it is frequently fatal. Why this should be the case, has not yet been explained, nor indeed, have the causes of the difficulty of acclimating either yet been understood; hence the methods of treatment to effect this object have been various, and capricious, and seldom persevered in with that steadiness and constancy which alone can ensure success. An examination of the arterial system of the ox, will, I conceive, most materially contribute to instruct us in the predisposing causes of disease, and consequently, the best means to be pursued for the purpose of preventing or treating it after it has been incurred.

The average pulse of the ox in a cold climate is stated to be about fifty* in a minute, and when the pulsations are more frequent than this, the animal is supposed to be in a state of fever. This it is most singular to state is not the case in the climate of Louisiana, the pulse of the ox being then in its natural state, 68 or 75, and rising on the slightest excitement as high as 80.†

What the cause of this incongruity of the pulse in different climates may be owing to, we do not pretend to know; but such is certainly the fact, and the knowledge of it, we conceive, will be found to be of vast value to those who are endeavouring to improve the race of cattle by importing stock from one country to another.

It is evident that the system of an animal must undergo a violent change, and one which, under circumstances the least exciting, must prove fatal, if it be carried to a situation which requires that the heart's action shall be increased more than one-third in a given space of time. It is also evident that any thing which has a tendency to increase a disposition to that action should be most carefully avoided, so that the requisite change in the system shall be produced as gradually and imperceptibly as possible. This increased action of the heart, the system of the ox is the less prepared to endure, in that the arteries of that animal are smaller in proportion than they are in a horse, and consequently less capable of sustaining any suddenly increased action.‡

From the above facts it is evident that the most proper dietetic treatment to be resorted to will be strictly antiphlogistic.

The quantity of food which the system will in ordinary circumstances require must be diminished, and all the common exciting causes of increased arterial action, such as the heat of the sun, quick motion of any kind, be avoided. Besides these, medicines which have a tendency to diminish the heart's action, must not only on the first attack of fever be resorted to, but should, we think, even in a state of health (though no advocate for such treatment generally) from time to time be administered. Bleeding, though the most valuable of all remedies on the attack, must not previously be resorted to, from a tendency which it has to produce in the system increased action, for the purpose of reproducing the matter taken away. Proper doses of the Digitalis purpurea *(foxglove)* may also be resorted to, and indeed all remedies which have a tendency to diminish the heart's action. Shade, a plentiful supply of water, for the animal to stand in during the heat of the day, I conceive to be of all things the most essential.

---

* Library of Useful Knowledge,—Cattle, p. 153.

† Something analogous to this seems to take place even in the vegetable economy. If a plant be removed from a cold to a genial climate, the habitude of growth peculiar to the soil from whence it is taken continues for one or even more seasons to affect it in its new locality,—on the contrary, if a plant be carried from a genial to a cold climate, its vigour and vegetancy is carried with it at first, and it will overshoot itself (as the vulgar expression is) or grow more to stalk than its new soil can supply fruit for. May this not be owing to some peculiarity in the circulating system of vegetables analogous to that in animals?

‡ Library of Useful Knowledge,—Cattle, p. 153.

Extirpation of Ferns. By Mr James Caird, Craigcaffie, by Stranraer.—I am of opinion that the destruction of this plant is not a desirable object. In the works of Nature, we generally find an adaptation of means to ends; and in the habits and nature of this plant, I think I can discover the hand of an all-wise Providence. The fern is mostly found in dry sheltered situations, such as rocky glens, or hill-sides not accessible to the plough. It grows on good soil,—the fern being always a favourable symptom of the quality of the land which produces it. In summer, it grows with great luxuriance, entirely overshadowing the grasses, and being almost impenetrable for pasture to either sheep or cattle. In this state it continues till about the end of autumn, when it withers and dies away, and then its usefulness becomes apparent from the fine fresh bite of grass that is found at its roots. The great want in most of our hill-pastures is winter food; and here, by a simple plan of Nature, do we find it provided in sheltered glens, or dry sunny hills, just at the season when shelter and warmth are most needed by the stock. No doubt, artificial food on many farms may do away with the necessity for this useful provision of Nature; but in most of our hill-farms, where artificial food cannot be raised, a preserve like this for the stock in winter, must be invaluable; and the extirpation of this plant appears to me to be an attempt of short-sighted mortals to defeat the designs of Providence.

The shepherd finds the fern a useful plant for litter to his cow, and, on many a hill-farm, it forms the chief constituent of the farmer's dunghill.

The remedy seems worse than the evil—if evil it can be called—for I can suppose nothing more injurious to a hill-farm than to have the dry sheltered portions of it irrigated by water, and thus rendered unfit and unhealthy for the stock in the bleak season of winter.

Inefficient and Cruel Method of Sweeping Chimneys.—Numerous individuals of the community exist, whose humanity revolts from the present mode of cleansing our chimneys from soot, and who would gladly adopt any other, if it were even less easily accomplished, and less efficacious when done, than that which has so long disgraced our civilized country,—if, by so doing, they could mitigate the sorrows of that numerous race—the little chimney-sweepers. But if we can prove, as we shall, that there is a method more easily accomplished, and more effectual, by which all assistance from *the profession* is superseded, we look to receive the thanks of our benevolent fellow-countrymen for the practical details which we are about to place before them.

We ourselves have ever commiserated the fate of that large proportion of suffering childhood, condemned to perform a revolting operation, by which so much of domestic comfort is insured; and when, some years since, an invention was made public, by means of which the same end was asserted to be attained, we were among the first supporters of the machine.

Innovation is abhorrent to an Englishman; and this sweeping-engine was condemned for faults which it did not possess: the thing, therefore, fell into disrepute,—servants disliked it, —master-sweeps would not patronize it. Thus, against two parties so interested and so formidable, what could a mere well-wisher to the scheme achieve? how could he make head against the enemy? There were, undoubtedly, two valid and serious objections to its general adoption, and drawbacks to its boasted success,—the one, that, in crooked shafts, or those chimneys which were turned into others and had a bend in them, the machine could not be made to act; the other, that, if the shaft was wide, the broom of the machine was not large enough to touch all parts of the chimney, so that a considerable quantity of soot must necessarily be left in the shaft. Still, defective as was the machine, we would have placed humanity as a set off against its deficient operation, and, *at that time*, have gladly adopted it as a *succedaneum* for human brooms; for then we knew not of our admirable plan, from which we would not return to any old system for a revenue of soot.

It reflects but little credit upon the judgment and sincerity of our noisy philanthropists, that so large a proportion of eloquence and money should be expended on suffering humanity in the "far west," while so much misery exists unalleviated at our very thresholds! He who can listen to the professional cry of oppressed and overtasked childhood beneath his windows, without feeling his better nature stir within him,—and who can yet elbow his pompous way to an anti-slavery meeting, and there "get up" a pathetic speech in favour of slaves with natural black skins, in other latitudes,—is, to say the best of him, an inconsistent being! The amount of crime and suffering among the multitudinous little "climbing-boys," in large town and cities, is appalling as well as disgraceful. So many improvements have been made,—so much comfort been added to our domestic existence, by means of scientific application, that we wonder no invention, more useful than this blundering machine, has been discovered, for the purpose of cleaning chimneys from soot. These unfortunate victims of cupidity and crime, who are, moreover, the only accredited medium of performing this disgusting drudgery, are proverbially inefficient in their vocation. Instances are of continual occurrence, in which the chimney has not even been ascended by the sweeper (we have ourselves experienced their deception and falsehood on two or three occasions); and, if they are not vigilantly watched, they will avoid going up to the summit of the chimney, where the chief part of the soot is collected. These stigmas to humanity, too, are made such by the force of circumstances. They are incited to dishonest practices; and a large amount of property is nightly abstracted from those dwellings, where eye-servants are left to superintend their operations.

Nor are these motives, which we have already detailed, for abolishing the method of sweeping chimneys by means of climbing-boys, the only reason to be adduced; there is yet another, and one far more cogent: it is, that so many instances occur of loss of life by suffocation, exhaustion, weakness, and the liability to become fixed in the shaft of an ill-built or contracted chimney.

From such contingencies and lamentable results, what nature, possessing one spark of benevolence, does not revolt? To obviate so much evil, who would not endeavour to adopt a less objectionable method; and, knowing one, who would not make it public?

Our own experience of the feasibility and excellence of the following mode, which is very simple, induces us to recommend it to the attention and practice of our readers. The best time for the operation is at night—the last thing before retiring to rest—though many may prefer the morning; but as the former suits ourselves and our arrangements, we detail it as it is performed. The fire must be taken off, and the cinders, as well as ashes, swept up and removed, so that the soot may remain pure. The chief cause, we should not omit to say, that we give the preference to an over-night attention to the clearing, is, that the heated air in the shaft is so rarified, that it tends to convey the soot upwards, or rather prevents it from falling so heavily down, as would be the case if the shaft were cold. The apartment being prepared, as if for the chimney-sweepers, and a garden mat, or large appropriate cloth, fixed up in the front of the mantel-shelf, a gun must be loaded, with powder only, and a person, generally a man-servant, holding it as high up the chimney as possible, on the left side of the fire place, discharges it. The gun should be quickly withdrawn, and the side of the mat or cloth kept closed for a minute. The explosion loosens the soot, which descends into the grate,—a portion of it, of course, escaping from the chimney-top. The gun must be reloaded, and again fired; and this will complete the night portion of the business. In the morning, the man-servant, or some person hired for the occasion, must proceed to the roof of the house, and, with a long pole, having a bush, or large bunch of stiff evergreen—such as holly, green furze, &c.—fastened to the end of it, he must cleanse the top of the chimney as far down as he can reach; and this should be performed before the housemaid shall commence to clear away the soot,—obviously to spare extra trouble.

Let not our readers object to this plan, on the score of innovation, difficulty, or expense: all improvement is innovation,—no plan can be achieved without difficulty, more or less (real or imaginary); and so far is the above from being expensive,—it is actually lucrative; for whereas by the "climbing-boy" method, the chimneys in a large house will cost thirty or forty shillings per annum, the soot is claimed by the sweeper, and, consequently, that valuable substance is lost to the owner. The new system, which we advocate, and have long adopted, is practised without the outlay of a farthing.

If it be objected, that lofty dwellings, and those especially in cities, are unscaleable, excepting by the aid of very long ladders, which must be hired; and that two or three of them must probably be lashed together in order to gain access to the top of the chimney,—we would reply, a trap door in the roof is more accessible, and no residence ought to be without that *safety-valve*; for in the event of snow melting rapidly on the roof, and penetrating into the rooms through two or three storeys, assistance is more speedily obtained and made available from within, than externally; and if a fire should occur in the lower part of the building during the night, what chance would the inmates have of escape from the tortures of being burned to death, but by means of a trap-door? The necessity of making a trap-door, therefore, in order to accomplish the minor matter of clearing chimneys from soot, may, *it is possible*, induce many persons to incur a requisite expense to obtain such a convenience, which the more cogent reason—of allowing their families a probable escape from death—might fail to accomplish. If trap-doors were but generally built, we would not cavil at the motive which might cause their being adopted.

We conclude that it is unnecessary to remind those of our friends who may have gardens, that soot is invaluable, either alone or blended with other substances, such as salt, lime, ashes, &c., for various purposes, particularly when mixed with mould, for the top-dressing of lawns and meadows.

Causes of Destruction by Fire.—Our feelings of regret and surprise are continually excited by the details we frequently see of accidents from fire: regret, for sufferings to our fellow-creatures caused too often by carelessness; and surprise, that an evil of so great magnitude should have failed to attract the attention of the scientific and humane, that, by being grappled with, if not overcome, at least it might be mitigated and placed under control.

Our humble influence shall not be wanting to impress our countrymen with the necessity for exertion; nor will we fail to point out several obvious reasons for the frequency of this calamity which we bewail.

The idle and dangerous practice of reading in bed has been a prolific cause of death to many. It is so dangerous and so foolish, that we always wonder at the trifling amount of good which could be found to counterbalance the prodigious risk of so much evil. The day is long enough for every laudable pursuit; and he is but an indifferent dispenser of that noble treasure, TIME, who thus misuses it. We could state many instances which have come under our own observation, of accidents resulting from the bad habit; but we abstain from relating the particulars, knowing that human nature requires identification and impersonation on all matters that are intended as warnings. Shew a man the half-burnt book, the smouldered blankets, the dismal bed, and the body of its occupant who had expired in torments, and the warning will awaken salutary alarm, and effect a cure of the baleful habit; but let the evidence be merely hearsay, and the terrible event will have come to pass in vain!

The risk to sleepers is lessened by substituting French bedsteads for those unwholesome cumbrous four-post bedsteads, which, while they impede that free circulation of air so essential to health, causes the hazard from fire to be extreme. We can speak from the experience of many years as to the value of "safe candlesticks" for the use of a family; they are constructed upon the principle of the "Davy lamp," that is, they are made of wire-gauze, circular, about ten inches in height, and four in diameter, open at the top, with a door at the side, and having a movable socket to contain the candle, which may be taken out at pleasure in order to light it, as well as for the purpose of cleaning it from tallow. Servants and children should be compelled to make use of these excellent utensils, which are, we should add, very durable and not expensive; they are japanned, and can be procured of furnishing ironmongers. Dwellers in populous cities have a heavier weight of responsibility imposed upon them than householders in the country, whose isolated domiciles confine the amount of suffering and loss contingent upon an accident from fire, to their own families; whereas the former have the lives of their neighbours, to an indefinite number, dependent on their caution and exertion. We consider it an absolute duty that the head of every establishment should, each night, ascertain that the bedroom candles of every member are extinguished. Children, from the carelessness of youth, and servants, too frequently from want of principle, are reckless of consequences; the latter, also, if females, have not generally that kind attention conceded to them by their employers which might enable them to devote a sufficient time to their own needlework, so that they are frequently fain to borrow that period from the night, after they have ascended to their bedrooms, which ought to be performed down stairs.

The master or mistress of a house should be the last to retire to rest. Wherever fire and candle have been burned, danger may lurk; and surely the trouble of an investigation cannot be placed in competition with the safety of those who are near and dear to us!

On no account should fire be left burning in a sitting-room, or even in a kitchen-range; for not only is there a probability that a lighted coal may fall out of the grate, and ignite some contiguous combustible, but cats, and even rats, have been known to cause accidents in consequence of a lighted cinder having fallen upon them while creeping to the grate for warmth, which, by adhering to their fur, has been conveyed rapidly to some article easily ignitable. In the event of the clothes of a family wash being left hanging to dry round a kitchen range, in which a fire has been purposely left to effect that which the bad state of the weather had been unable to accomplish, the risk of fire from the above cause is very great; and yet it appears so improbable that danger could arise from such a source, that few would believe what is nevertheless true. No sitting-room should be left during the day without a fire-guard hung upon the bars; and the same simple and efficient preventive ought always to be used when a fire is required in the sleeping apartment of an invalid during the night. Fire-guards are, or should be, considered indispensable where children are liable to be left alone; numbers of premature and painful deaths have occurred from the lack of these useful articles.

Farm-houses, and indeed all country residences in which families are accustomed to bake their own bread, are especially subject to fire, in consequence of a malconstruction in the flue of the oven.

It is, in general, the custom for the ashes to be scraped out, and taken soon afterwards to some appointed spot in the open air, where they are left, too frequently without even that necessary act of duty being performed—quenching them with water; or, if done, so carelessly, that some of the embers are left alight, when, should a brisk wind arise, they rekindle, and are blown about to the imminent peril of ricks and stacks, as well as the unsuspecting owners. This is no imaginary contingency; the evil has occurred. We have witnessed the effects of re-ignition in apparently dead wood-ashes after they had been abstracted from the oven two days, and have ourselves narrowly escaped from accident in consequence. The safest plan of building an oven ash-flue is the following:—

It should be premised, that a brick bread-oven ought to be under the roof of the dwelling, and not erected externally; the comfort and convenience of our dependants being a matter by no means to be neglected. A back-kitchen or wash-house is the best situation, contiguous to the kitchen where the bread is made. The chimney, of course, is above the mouth of the oven, and if it take a turn, and make an exit into the wash-house chimney, all the better,—there will be less liability to smoke in the event of a change of wind. The front of the oven even with the bottom of the door, ought to be of the width of a foot-tile, not only for the convenience of resting the pee r while " setting in" or removing dishes, &c. when the baking is finished, but in order that an "ash-flue" may be built in the front wall. Instead of the brick-work being solid throughout, a chimney or flue should be left at one side, about eight inches square, to slope in the same direction as the upper or smoke-chimney. This flue is to have a square opening at the bottom as wide as the flue itself, for the convenience of removing the embers with a fire-shovel, when they shall have been burnt fine and powdery; which will be effected in the course of two or three days, by means of the draught of air that will be caused, by placing a piece of sheet-iron against the opening on the floor, regulating it so as to admit the requisite strength of current, to burn the ashes; a crack an inch wide at the lower end will be found sufficient. On clearing out the oven after baking, the burning embers will slide down the flue, and lodge against the iron plate, and the draught of air will begin the work of pulverizing them for use, while the light dust, which would come out in clouds and smother the operators—as well as extend to every article, utensil, and person in the back and adjoining kitchen,—is, by this simple and easy process, carried up the smoke-chimney at the mouth of the oven; and thus, facility, safety, cleanliness, and despatch are insured, for the cost of a shilling or two; indeed, where the members of a family possess a tact for domestic ingenuity and contrivance, a few waste bricks and three tiles, with a little mortar, are all that would be required, and it could be effected free of cost. Those who have experienced, as we have, the inconvenience of an oven without an ash-flue, and the safety and availability of this useful appendage, will be best able to appreciate this domestic blessing.

Few of our readers can be unaware of the utility of wood-ashes in a family; but if there be but one to whom the information may be acceptable, we should regret to withhold it. To soften hard water, or even to communicate an additional property to rain water for a family wash, they are far more desirable than either potass or soda, both of which injure the flesh of the laundress, the former especially; and besides, the one is costless, and the other must be purchased. The best receptacle for the ashes, preparatory to a wash, is a canvass strainer nailed slack upon the upper ridge of a box without a lid, the bottom of which is perforated with holes, to admit the free passage of the water. This box or strainer is placed on two sticks, which are laid across the top of a washing tub, the wood-ashes being put in the canvass, water is poured upon them, which runs into the tub below; more and more being added, until sufficient water be softened for the required purpose.

Wood-ashes ought likewise to be used for scouring kitchen-tables, dressers, &c., as well as floors of rooms, for which purpose it is, in conjunction with white sand, or mason's dust, greatly to be preferred to soap; which last is not only an expensive article in a family consumption, but when used for scouring makes the boards yellow, and causes them to be easily marked.

For purposes of horticulture also, wood-ashes are useful, and should be carefully preserved; their utility in cleaning tins, saucepans, dairy utensils, &c., is too well known to be further alluded to.

To resume our remarks upon the causes of accidents from fire, we have always considered that the building act has not shewn in its several clauses, a sufficient regard for the safety of the community, which the legislature of this great country ought to evince. An absolute interdict should be imposed upon builders against the use of timber for the floors of the basement stories; not only would timber thereby be greatly economised for other purposes in which its use is indispensable, but our quarries would be brought more into operation, in order to supply the increased demand for slate, stone, cement, brick, and composition, with which to construct such floors as have been hitherto formed erroneously of boards; an additional means of safety from destruction of life and property by means of fire, would be thus established by law. When a fire occurs in the lower part of a dwelling-house, during the night, a painful death is almost inevitable to its inmates, from a quantity of wood-work being employed where other and incombustible materials would be used with better results; particularly, for the staircases, which, in the generality of houses in the large towns of England, are constructed of timber; if the staircase take fire (and what should prevent it, since hall-floors and thin skirting boards are of wood, forming a continuous upward line of fire from the cellars to the attics ?) and if the house be unprovided with fire escape-ladders, what but a miracle can preserve the family in the upper rooms from destruction ? Fires under precisely the above circumstances, occur nightly; yet is no legal measure adopted by government to prevent future buildings from being constructed upon the same unwise plan.

It is so important to economise the ground in closely populatod cities, that the health as well as safety from fire, of their inhabitants, is lost sight of, and houses by hundreds continue to be erected with only one staircase, and that entirely of wood, even to the balusters, instead of having two sets of stairs, built of stone with iron balusters and handrail. Persons in general are little aware of the convenience as well as salubrity of the double staircase; not only is that which is appropriated to the domestics, used by them in their daily employments among the bedrooms, but a free circulation of air is continually at command; and in addition, economy in stair-carpeting is ensured, in consequence of the decrease in the passing of the servants up and down the front stairs.

With all our precautions, we who dwell in streets are liable to injury by fire, in consequence of our contiguity to other houses; it, consequently, is indispensable for *all* who live in towns, to be provided with fire escape-ladders; we know their utility, and therefore urge our readers to procure them without delay; they are very simple in their construction and adaptation; a trap-door should be made in the roof, in the frame-work of which two strong iron eyes must be fastened. A ladder ought to be made, wide, and with broad steps, with a hand-rail on each side, which, for the convenience of putting away in a small compass, must be made with hinges and bolts, to lie flat against the steps, and yet to be easily and quickly adjusted, the hand-rails are not essential, but would greatly facilitato the safe transit of timid women and young children. Two hooks on the top of the ladder are to be fixed so as to drop readily into the eyes in the trap-door, the bolts and fastenings of the latter being kept well oiled, to render a sudden exit easy, in the event of an alarm of fire in the night. For the outlay of a few shillings the master of a house could thus secure the escape of a beloved family; yet such is the supine, yet hopeful disposition of man generally, that the same being who would expend fifty pounds upon a useless luxury, would demur upon the necessity of this cheap and useful ladder, trusting, perchance in vain, that his family will never be placed in circumstances of such peril as to require its aid.

An unsuspected cause of fire is in the shafts of old chimneys, in houses that have been built before the passing of the building act, when wood was cheap and builders ignorant. Beams were introduced into chimneys, where now no wood is ever used ; and frequent accidents are the result of these interlopers taking fire, from the carelessness of servants. All owners and tenants of old houses, who may be intending to alter, reset, or renew any fire-places, ought to extend their work and ascertain if any wood be lurking in the brick work, and increase their outlay to the amount of the very few shillings which it would require, to make the requisite investigation.

The Different Breeds of Sheep. By Mr William Hogg, Shepherd.—Of all our domestic tribes of animals, sheep, in their figure and their coat seem most obsequious to the will of man; they were the first class of creatures which man domesticated; and before they were made subservient to the purposes of human life, we cannot but suppose that considerable alterations were made both upon their figure and their coat, and since that time down to the present, its native energy has been diminished and its muscular strength abated, by mixtures of blood from different races. Some of these connexions have no doubt been with pure breeds, at least with breeds as pure as the diligence and ingenuity of man could make them ; others have been with varieties in which the very being of the creature was overwhelmed with mixtures, and it should be recollected that an union of living natures is not like a mixture of dead or inanimate matter; the latter, though its parts may be a little altered, yet they may be analyzed or separated so as to possess nearly the same original qualities, but an union of two living beings in one subject is what can never be separated, the vitality of the subject in which they reside both supports and perpetuates their individuality. By continued accessions of nature from one kind, the peculiarities of the other may be totally overpowered or suppressed, but they never can be finally eradicated, and if its being was not either by accident or by the agency of man again entangled with other mixtures, but left to propagate in its own lineal descent, it would through time wash itself free of all extraneous connexions, and again approach the original type in all its properties; allowances, however, being made for the influence of local circumstances, such as soil, temperature, &c.

I do not believe that at this time, in Scotland, there is one flock of sheep, or that there is one individual sheep, but what has different bloods centering in its present being. By directly cultivating the peculiarities of one variety, all indications of other connexions may be lost, or rather suppressed; but they are only concealed or overpowered by continued intromissions from one breed, which it is the design of the manager to establish. When two distinct breeds, either through accident or design, are allowed to copulate, the former connexions, which had been contracted with more primitive races, begin to shew themselves in the immediate issue; they had hitherto been overpowered by continued accessions of nature of the same plastic influence, but, like all spirits held in a state of abeyance, now when they find the ordinary course of propagation interrupted by a connexion with another breed, the disturbance occasioned by this mixture permits them to exert themselves, and, by their appearance in some shape or other, give evidence that they proceed from principles as inherent in the animal's being, as those which, for a series of years, it had been obliged to exhibit. These marks of an old and distant alliance appear as deformities, as they no doubt really are to the subject in which they reside, and cannot easily be distinguished from the results of that opposition, raised by the last mixtures in which each breed struggles to exhibit its own peculiarities. If the legs of this issue are clumsy and ill made, the joints to appearance stiff and thick, the wool unequal both in length and fineness of pile, but especially if small orbicular spots appear on the cheeks, ears, &c., these, especially the last, indicate, that one of the breeds, if not both, which formed the last conjunction, had been far from a state of purity when the union took place. Many of the transmigrations which this inoffensive creature has been subjected to is on account of its wool: this is either thought too coarse, or not produced in such abundance as the local situation promises it might be done in; or is produced in a state which disqualifies it for going through subsequent operations with ease and advantage to the manufacturer. It is found that external applications cannot secure these properties, and there is no other alternative but changing the form and flow of spirit in order to insure their existence. This is a tedious task, and if the seasons be unfavourable, on exposed situations is far from being without hazard, as a mongrel progeny is always an unproductive, infirm stock.

It is the custom of this country, and I may say each separate district in the country, where every degree of elevation and exposure requires a more hardy and robust form, to settle upon a breed of that figure and strength of spirit which is known to be commensurate to the hardships and difficulties of the situation, to purify this breed as far as possible from all foreign connexions; and when thus simplified, to keep it as graceful, as showy, as healthy, as uniform in coat, figure, &c., and as well adapted for the farm as is consistent with the permanence of its other excellencies,, but to fix upon that description of stock which will have and retain these peculiarities, which directly suits the various altitudes of the country, is the principal difficulty in store-farming.

The Cheviot breed has been in possession of the pastoral districts of the south of Scotland for about half a century. They seem to have been deduced from the heath or mountain breed at a very remote period, the small round spots of black which are often scattered over their cheeks, or the faint sprinkling of grey mixed with the white of the Cheviot face, testify this; but what is a surer test of their Heath original, is the tendency which Cheviot stocks have to assume the figure and coat of this breed, and the rapidity with which successive generations hasten back to this original, when the Heath ram is admitted to them; besides, to keep a Cheviot stock pure, it has always at no great distance of time to be recruited and refreshed with new and pure Cheviot blood. A certain indication that the creature's being is held in a state of constraint by man's interference.

The Leicester breed have of late been seen slowly creeping up the Scottish glens. Their tendency to fatten early is likely the cause of their adoption. Many farmers, however, cross the Cheviot with the Leicester ram, selling to the butcher the whole progeny, and recruit their ewe stocks again by purchasing second ewe lambs. Thus a strange stock is introduced to the pasture every year, which certainly augurs not well for the prosperity of sheep stocks; their strange lambs cannot thrive like natives of the soil, and as they are invariably seconds they must be smaller in the bone. But I apprehend the Leicesters are too stiff and indolent in their manners to be indiscriminately applied to a hilly district.

Feeding and Dressing of Tups. By Mr William Hogg, Shepherd.—On the fraudulent intentions of those storemasters who dress tups for sale, Mr Hogg has justly remonstrated in this Journal on former occasions. He now remonstrates against the encouragement given to such a practice by Agricultural Societies.

"As institutions for the prosperity of the country, which the wisdom of the nation has devised, and the wealth of the nation seems designed to support, must certainly be right, and must certainly be of great advantage to the various branches of rural affairs, to which the different parts of the establishment expressly apply, it will, no doubt, be thought presumptive in an unsupported individual to censure any of the measures which the Highland and Agricultural Society have judged expedient to adopt for accomplishing these important ends. Yet the allowance given for that extra feeding and dressing of tups for their national exhibitions, confers only a license to put the animal out of its proper shape, and put it into that state in which it is an insult to offer it for the approbation of any person. It cannot be kept in that condition, and it no more resembles that stock of ewes it is supposed to represent, than if it had no connexion with them; indeed, the connexion is perhaps no more than impregnating a few the preceding year. Were the ewe stocks inspected themselves, and compared with the animals exhibited at these shows, what a miserable falling off would there be: they would scarcely be thought of the same variety with the animals shewn, and the Society can form no real estimate of the skill of the manager, nor of the worth and excellency of sheep-stocks, of the uniformity and value of fleeces, till they inspect the sheep themselves,—till they see them in that state into which the united abilities of their manager and pasture have brought them.

" It will be said, storemasters will not consent to an inspection of their stocks ; I believe some will not be fond of it ; and perhaps those who have formerly gained premiums for tups, will most firmly resist the measure. But I do not believe that any generous, liberal-thinking man would resist the proposal ; and till the Highland and Agricultural Society look on sheep-stocks as they exist in their native state among the hills, their exertions otherwise will be of no service : the report then given will declare what is most deficient, either in shape or coat, their likeness to one another, and the equal gradation of size that should prevail among the different ages ; but to confer premiums for putting a creature out of its true shape, and which will be of very little service for the time to come, serves for no other purpose than only to manifest to the world, what the ingenuity of man can urge the creature to by excessive feeding.

" The collecting a flock of one thousand is very little trouble, perhaps half or the third of this number would be sufficient ; and as the inspectors would be upon the ground, their report might also include how the boundaries of the farm was settled : that is, if they were awkwardly or conveniently adjusted with respect to neighbouring pastures,—where marshes appeared to be troublesome,—if dykes have been erected,—if a proper and sufficient system of draining had been adopted, and where the pasture required it,—if it was moderately and artificially irrigated where water was attainable,—and, in general cases, it would be found, that the excellency of the stock exactly corresponded with the right and judicious execution of these and sundry other items which I need not mention.

" To judge of the size, shape, coat, and condition of the sheep-stocks by the same properties exhibited by tups submitted to inspection at those national shows, is quite wrong. Scarcely a resemblance can be traced. Though still the exhibition would be imperfect, yet it would convey a juster idea of the state of a breeding-stock if the whole lot of tups, which had been employed on a flock were produced. It would be more manifest what incongruous shapes and coats,—not to say what variety of breeds, were discernible in those predecessors of a breeding-stock of ewes. Indeed, I have always thought that the shows, circumscribed within a certain locality, have done more good to sheep-stocks than the great shows at our principal towns. At the former, the animal is there seen nearer its true shape, habits, and condition ; but, for the latter, so long pampering and preparing the creature puts it altogether out of its own sphere of life.

" There is a consideration, if it could rightly strike the minds of those in higher ranks of life, and who are very anxious for the propagation of every useful art by which their country can be ennobled : there is a certain point of excellency, both in figure and coat, to which the Scottish hill-pastures can carry sheep, and that on many farms this point has been attained. Not on every one where it has been attempted, however, though the failure has principally been owing to bad management either of the stock or pasture. This point of perfection is at a great distance from that strong condition and vigour which artificial feeding gives, and still farther below that goodliness which such operose and tedious preparations give to tups, previous to a general show. Again, there is a medium habit to which the general temperature of our climate brings stocks of sheep; if the winter be long and severe, they must fall below this point; if wild and open, they will be above it, yet let the winter be ever so good, there is great declension of flesh and spirit from that degree of excellency, when in their prime at Martinmas. Now, whatever means are used to urge sheep above that point of excellency to which the soil of their pasture naturally takes them, they are unnecessary, they are useless, nay, they are really hurtful; for when the additional feeding is withdrawn, and the unassisted soil left to its own energies, it admits of a declension through winter below the general habit of the stock, proportioned to that degree of fatness which artificial feeding had conferred through summer.

"Let these propositions be duly considered, and they will shew the inutility of attempting to ape any description of sheep on hill-pasture, above that medium state which winter never fails to impose, or of improving them beyond that degree of perfection which the soil naturally gives. Where the nourishing powers of the pasture are kept in full activity, every desirable peculiarity in the animal is of a higher description; but about the beginning of the year among mountain sheep, the cold and other privations peculiar to high situations begin to counterbalance the energies of the soil, and if the spring is severe and prolonged, the stocks of sheep go down to a state of imbecility quite below that of mediocrity.

"I am tolerably certain, that the general shows have not contributed so much to ennobling sheep-stocks as some would surmise. There are many sheep-farms from which a tup was never taken for one of these shows. On these farms the stocks are as good, as valuable, and as productive, as those from which premium tups have been selected.

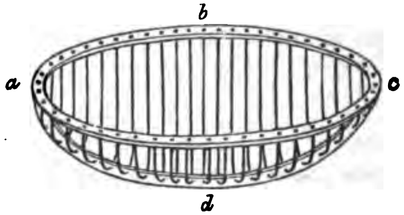
"It is not from half dozens of sheep prepared for a national exhibition, that the Highland and Agricultural Society can come at the true state of sheep flocks among the mountains of Scotland. They must look upon the broad face of Nature which no art can disguise and no cunning can disfigure,—the flocks, the ewe flocks themselves, should be inspected,—and along with them the pasture on which they are fed, and it will generally be found, that the improvement of the latter contributes largely to the excellency of the former."

Very nearly allied to this subject are these remarks of Mr Hillyard of Thorpelands in Northamptonshire, contained in a letter addressed to Colonel Challoner.

"The present general system of making tups very fat is very bad. They ought, when put to the ewes, to have flesh enough on them to be in full vigour, but they should be active on their legs to seek out the ewes which may be inclined to take them; instead of which, most of the Liecester tups can only waddle among the ewes, and are often seen with many around them. I am inclined to believe what an old shepherd said to me, "Very fat tups have not so much seed in them as those which are not so fat." I have often hired fat prized tups, but having had these two or three years past a great many barren ewes, do not mean again to do so; at any rate, not when the time of exhibition is near the proper time of putting them to the ewes; hastily reducing them must be wrong—they ought not to be put to the ewes in a reduced languid state. If tup breeders were not put to such useless expense in making their tups so very fat, they might afford to let them at less prices; but fat covers faults. Liecester tup breeders keep their tups apart from the ewes, and use teazers; this practice well answers for them, but does not suit those who breed only to sell mutton, and who do not keep a shepherd that does nothing else than attend the sheep.

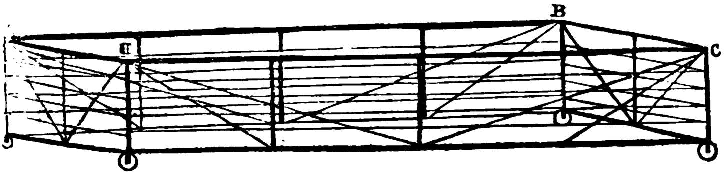
"I know some tup breeders who much condemn this fat tup-making system, still, as others will continue it, they are so obliged. I wish some one of them would assist me to prove the waste of food, and the deception in this practice, by selecting from their tup lambs, two by the same tup, out of equally good ewes, and that were as much alike as it were possible to choose them in the quality of their wool and meat, to let me have one to keep with my wether lambs, in the early part of the winter on uncut common turnips, afterwards on cut Swedes, but without either cake or corn, or even hay, excepting in frost and snow, and in the spring turned with them into a fair pasture: the breeder to keep the other in his accustomed most expensive manner, which in general is in this way:—in autumn, cabbages; winter and spring, cut Swedes; summer, clover of that height that, when the sheep are lain down, none are seen by persons walking any distance from the field; to all these indulgences they have at all times either cake or corn, and the system of many is to give both. Although all tup breeders must allow that the produce of the tup kept, as I should keep it, would be quite as good as that from the high-fed tup, and in all probability much more numerous; still, when the two tups so differently kept should be exhibited side by side for letting, and the owner of them finds he can let the high fed sheep for perhaps double the amount of the other, it is not surprising that the system would be generally continued, although many of the tup breeders condemn it, and although it is actually a public evil. I do not mean to say that it can never answer to give sheep cake or corn on poor land, or that when corn is at a low price on land that is of better quality; but cake should be prohibited from being given to tups exhibited for prizes, and it would not excite suspicion as to the accuracy of the owner's certificate if the judges offered a piece to each sheep, which it will not immediately lay hold of if it has never eaten any; for, it is well known that many shepherds, to gain credit for their superior management, would give it unknown and contrary to the orders of their masters."

Wire Turnip Baskets. By Mr G. Buist, Bombay.—A very excellent substitute for the large ozier or willow basket, employed for carrying in turnips to feeding cattle, and in some parts of the country known by the name of "*skulls*," has lately been introduced, by substituting stout wire, of small round iron rods, instead of ozier, as the material out of which the basket is made. The common willow *skull* costs about 1s. 6d. It is very apt to be rotted or broken; and, after the natural sap is dried out of the willows, which it generally is in a few months' time, they become particularly brittle. In short, a *skull* seldom lasts above one year—never above two; so that as some half dozen of them, at least, are required in large feeding establishments, the cost of them, though inconsiderable individually, becomes, in the aggregate, so considerable as to make its avoidance highly desirable. The iron basket is of the same size and general form as the ozier one. The rim *a b c*, which forms its mouth, is a flat slip of iron about ¾ths of an inch in breadth, and the keel (so to speak) *a d c*, is of similar dimensions and material with the gunwale rim. Holes being punched in them, about three inches apart from each other, the wires, or small round rods, are inserted, receiving such a bend as the form of the basket demands. The ends of these, attached to the gunwale rim, are made fast by a countersink-rivet, and handles being fitted to the end of the basket, or to the end of the wire itself, according to the taste of the workman, the fabric is complete. This sort of basket can be made for from 2s. to 2s. 6d.; and if at all properly taken care of, will last from five to ten years. Moreover, should any of the wires get loose or wrongly bent, or the mouth-piece or keel become twisted, they can, to any extent, or as often as may be required, be readily put right by the blacksmith. I have not seen wire applied to any other form of basket than that



just described. There seems no reason to doubt, however, that it might be employed with equal expediency, though in a different form, in the fabrication of the ordinary potato and other baskets, so much required about a farm, and so apt rapidly to go to decay. Perhaps, the best for ordinary light baskets would be that lace-work sort of texture, employed in protecting windows from the street. They could be very readily and economically obtained, and would be at once light, cheap, and durable.

Hurdles for feeding Sheep on Flower-Gardens and Pleasure-Grounds. By Mr G. Buist, Bombay.—Under many conditions of the surfaces and circumstances connected with the state of the turf of flower-gardens, and pleasure-grounds, nothing could be more desirable than to substitute for the operations of the scythe, the grazing of sheep, so as at once to clip the grass close to the roots, and to harden and manure the surface. The contrivance about to be described for effecting this object, does not claim the praise of entire novelty, but is an improvement on the clumsy and coarse-looking made structures heretofore used, effected by the substitute of iron wire instead of wood, and the adoption of the diagonal trays employed in the common wire bridge. A B C D is a wire cage for the sheep, whose form requires no explanation, 18 feet long and 9 wide. The framing is of light bar iron, the filling up of wire or rods the thickness of small goose quills. It is supported at the corners by four small universal moving wheels or castors. The end A D opens up and forms a door. The whole of this may be made for about L.3. A couple of sheep or so, placed in one of the cages, nibble away at the grass, and make it fine and smooth; and being moved about the garden in their crib, they are thus taken over the ground required to be grazed. So far from being an eye-sore, these cages are rather ornamental in

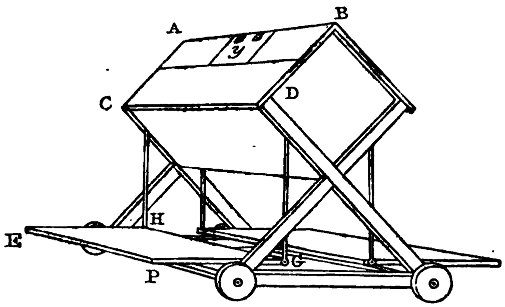


pleasure-grounds. The above sketch is taken from a crib made by Mr J. Douglas, blacksmith, Cupar, the best makerof these things.

Rain-Proof Sheep-Feeding Troughs. By Mr G. Buist, Bombay.—In the better cultivated parts of Scotland, the introduction of Leicester sheep has now become very general—a thorough knowledge of the best mode of treating them is of the utmost importance. It is generally alleged against us, by the most skilful breeders in the south, that we in the north do not as yet sufficiently attend to the genuineness of the diet of our Leicester stock—to varying or increasing their pasture diet in particular—by food of other sorts being placed within their reach while they feed in the open field. While the justice of the charge cannot be in all cases denied, it must not be permitted to be more extensively applied than it is deserved. In the county of Fife, in particular (we believe), the system of careful and copious out-door feeding is practised to an extent that cannot and need not be surpassed. To a Fife farmer, Mr Bell of Hill-Tarvit, near Cupar, (if we are not misinformed) we are indebted for the following beautiful contrivance—or more properly speaking, perhaps, new adaptation of an old contrivance for feeding sheep with grain, oil-cake, &c. in the open air—the general introduction of which would be an equal source of saving to the farmer and benefit to his flocks. The contrivance alluded to, is an adaptation of the common pheasant-feeding box to the sheep-trough, with the addition of a simple application of the bird-cage watering glass. This will be readily understood by those who are familiar with the pheasant corn-feeding box, and we hope, by the help of a wood-cut, to make it intelligible and appreciable even to those who have not.

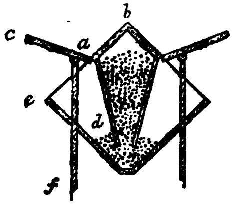
ABCD (fig. 1.) represents a sheep-feeding trough, movable on low trucks or wheels. EPGH is a platform of wood extending longitudinally to the length of the trough and parallel to its axis, and made fast, by means of a pivot, to the framing at either end. It is so poised that it will yield downwards when pressed by a weight of about 20 lb. at its outer extremity EP, —its inner extremity HG rising of course at the same time in proportion. At the inner extremity, and at the points H and

Fig. 1.



G, are fastened slight iron straps, extending upwards to the corners of the trough-lid CD, which lid, by its own weight and the pressure of the platform, remains shut, till some such weight as that described is imposed at EP; when, of course, as the platform falls, the lid opens and remains up while the pressure continues to act. The form of the trough itself will be best understood from the sketch (fig. 2). It is about 6 feet long, consists of three parts, a centre-box and two wing-boxes. The centre-box may be filled to the top with food, and receives its charge through the small lid *y* in fig. 1. This box communicates freely at bottom *d*, with the wing-boxes, out of which the sheep actually feed. The finest grains fall first through however, as those from without are eaten away. Such, then, is the cage water-glass part of the structure above alluded to. In fig. 2, the lids or covers *c a* of the wing boxes are represented as lifted up, *f a* being the straps connecting them with the platform by which they are raised. The middle trough then, being charged with its supply, a small portion falls into the bottom of the wing-troughs, as represented at *d* fig. 2; the covers are then shut down, and every thing continues quite safe from wind and rain, and the trespassing of pigeons, crows, and birds, or vermin,—and even salt itself or other solubles protected from rain. Directly now that a sheep, knowing where food is to be had, steps upon the platform,—and this is a piece of education they very speedily acquire—the trough-

Fig. 2.



cover rises, and then they find their food fresh, sweet, and dry, not even infected by the breath of previous eaters; and falling down to them from the store as fast as it is eaten up, and in such quantities at a time only as is required by them. Well as this looks theoretically, its operations have here been tested and practised, and found to work beyond even what theoretical expectation would have led us to look for. Our own observations have been confined to the farm of Hill-Tarvit above alluded to, whence the above sketch has been drawn.

MISCELLANEOUS NOTICES.

I. *Cottage Windows.*—We have much pleasure in giving place to the following judicious and well-timed remarks on the efforts which the Highland and Agricultural Society of Scotland is making to improve the condition of our labouring classes:—

"The Highland and Agricultural Society of Scotland, never inattentive to what will promote the prosperity of the country, is endeavouring at the present moment, and for some years past has been making similar efforts, to advance in every way the comforts of that useful class of the community, *the labouring population.*

"Having such laudable objects in view, premiums for some time have been awarded in different districts of Scotland to those cottagers residing in them, whose cottages were neatly kept, and whose gardens were well cultivated. These rewards have not been uselessly distributed. In most parts of the country more attention is paid to keep the cottages neat and clean, and the gardens around the dwellings of the industrious labourer are seen better attended to.

"It is a general observation, and we believe not an untrue one, that for the most part, where the cottager's garden is well managed, the interior of the cottage will be found to be neat and clean, and the manner of its inmates orderly and moral. It ought to be one of the greatest of gratifications that a landowner can enjoy, to see the cottagers around him living happily and comfortable. In order to bring about such a happy condition in the family of the cottager, let every right-thinking proprietor of land allot *one rood* of ground to each cottage, to be cultivated as a garden. This small portion of land, under the skill and industry of the cottager, would provide him and his family with many comforts that cannot now be commanded.—Hence the vast importance to spread far and wide, among the labouring population, a greater love and attention to common Kitchen Gardening. For such reasons as these, the Highland and Agricultural Society of Scotland are most laudably encouraging by every means in their power a diffusion of such a taste for gardening.

"To improve the form and convenience of the cottager's dwelling-house, the same Highland and Agricultural Society offer honorary medals to such of the landowners of Scotland who will construct cottages on the most approved plan in all these respects.

"As, however, the windows of the Scotch cottage are generally of an expensive construction, and far from being convenient, this year the Highland and Agricultural Society offer a premium of *Ten Sovereigns*, to whoever will produce to their Secretary, Sir Charles Gordon, in September, in Edinburgh, *the best model of a cottage window.*

"'*Specifications of the Window.*—1. Ten Sovereigns will be given for the best and approved cottage window. 2. The design must combine economy in the construction, efficiency in excluding rain, &c.; affording means of ventilation, and admit of repair with glass of the proper dimensions, furnished without the assistance of experienced tradesmen. 3. Competitors to state the price at which they will supply the windows to the public. 4. A specimen of the window proposed, with a statement of the necessary particulars, to be lodged with the Secretary of the Highland and Agricultural Society, in Edinburgh, on or before the 1st of September, 1840.'

"We hope all architects, and those gentlemen and tradesmen engaged in the iron-foundry business, will listen to this intimation, and that they will aid and co-operate with this patriotic Agricultural Society of Scotland, in contriving such a form of cottage window as is wanted.—It may be stated that the prize specimen of cottage window will be exhibited at the great Agricultural Show Meeting of the Highland and Agricultural Society to be held in Aberdeen in October next, 1840."—*James Stuart Menteath.*

II. *On Preserving Wood.*—In the *Civil Engineer* and *Architect's Journal,* No. 28, Jan. 1840, there is a notice at p. 27, describing a Patent obtained in the United States of America, to preserve wood by boiling it in lime water. The Editor of this Journal properly remarks, that wood might be much better prevented from decay, by soaking it in a strong solution of lime in cold water.

Lime when fresh burned or calcined is soluble in about 800 times its weight in cold water; but in much less quantity in boiling. And thus, if wood be soaked in a cold water solution of lime, more of the calcareous substance will be imbibed by the pores of the wood; the sap and other vegetables of the wood will also be more fully exposed to the action of the lime water, and more likely to undergo the chemical changes which seem necessary for the preservation of the wood, than when put into a boiling solution of lime water.

The same Editor states, that he is unacquainted with any facts that confirm his opinion, that wood would derive more benefit, as to its future durability, by being steeped in a solution of lime in cold water. We are happy to supply some facts which have lately fallen under our immediate observation, and which prove in the most satisfactory manner that wood, even of the most perishable description, may be preserved for many years previous to use, by soaking it for some days in a cold solution of lime water.

Having lately been in Scotland, among other places we visited the Limeworks at Closeburn, in the county of Dumfries. These interesting works belong to Sir Charles G. Stuart Menteath, Bart. and are carried on in a very scientific manner. The stratification of the limestone offers the mineralogist a great treat—the mechanical contrivances also, to raise the limestone from the mine, the construction of the kilns for its calcination, and the other operations going on, are all well worthy of the examination of the inquisitive traveller.

After viewing all these interesting sights, my attention was next directed by the clerk of the works, Mr Graham, to the preservation of wood by steeping it in a cold solution of lime water. I was conducted by him into his house, and shewn the timber of the roof. This roof had been erected upwards of forty years, and was constructed of common Scotch fir, of twenty-eight years' growth, raised on the estate of Closeburn. On inspecting the large timber of the roof, we could discover no symptoms of decay, either from being worm eaten or otherwise injured by time. It was perfectly free of worms, and is nearly as sound as the day it was first put up. But in the smaller wood of this roof, we perceived many marks of the ravages of the worms upon it. These insects had penetrated it in every direction, and injured it to that degree, that it must soon be replaced by fresh wood. Inquiring how this could be accounted for, why the large wood had escaped, and the smaller timber had fallen a prey to these tiny destructive creatures, we were informed, that the larger timber had been soaked in the cold water solution of lime, but that the smaller had not undergone the same treatment.

The following detail was given us of the method which Sir G. S. Menteath employs to prepare his wood for building purposes:—It may, however, before proceeding to relate it, be remarked, that wood contains saccharine and albuminous substances. The latter, viz. the albumen, when the wood is placed in a damp and confined situation, very readily decomposes and passes into the disease called "dry rot," which proceeds from a plant of the fungus family, produced by the decayed rotten wood. The albumen, as well as the saccharine ingredients of the wood, furnish the food of the worm. Its parent, either a fly or a beetle, led by instinct to this already prepared magazine of food for its offspring, lays its eggs in the wood. These eggs in due course of time give birth to the worms or maggots, which, as soon as they issue from them, commence their devastations upon the wood.

Lime water is found to produce great changes on these vegetable elements of wood, the albumen and saccharine matters. Whether the alkaline properties of the lime destroy them, or enter into new combinations, is not well ascertained. These effects the chemist, perhaps, will be able to explain. Certain, however, it is, from the valuable instances of wood steeped in a cold solution of lime water as seen in the roof at Closeburn Limeworks, that wood, even of the most perishable kind, when well soaked in such a solution, is freed from the destruction of the worm—is also less liable to be attacked by *dry rot*—and is rendered durable and sound for years.

The wood which Sir Charles G. S. Menteath employs for roofing buildings is chiefly Scotch fir. He has been in the practice of steeping this wood previous to using it, in a strong solution of lime water for upwards of *forty* years. Scotch fir, that has not been soaked in lime water is known to last in the roof of buildings very few years, and it is soon preyed upon by the worm.

The method pursued at Closeburn in preparing wood for the purposes of building, is to saw it into such lengths as the occasion demands. Next to plunge the planks or beams into a pond of lime water. The pond is made 30 or 40 feet long, 5 or 6 feet deep, 16 or 18 feet wide, the bottom and sides are rendered water tight. It is then filled with cold water. Before receiving the wood, a quantity of fresh burned hot lime is thrown into the pond, which is well stirred with the water to dissolve as much as possible of it. Into this strongly impregnated solution of lime water, the wood in the various shapes it has been sawn into, is then thrown in. As lime water absorbs carbonic acid from the atmosphere, the lime previously held dissolved in the water, becomes insoluble, and is slowly abstracted from the water, and deposited at the bottom in a solid state, as mild lime or carbonate of lime; hence the necessity of now and then throwing in fresh portions of recently calcined lime, that the water may be resaturated with the strongest solution of this caustic alkaline earth.

With respect to the period that it is necessary to soak the wood in lime water, it must depend very much upon the thickness and texture of the wood; roofing timber of fir will require a fortnight or more; larger and closer grained wood than the fir ought to be in the lime water pond three or four weeks or longer time.

After removing the wood from the pond it must be allowed to dry, and season before it is used.

Among the benefits that this preparation of wood by Sir C. G. S. Menteath presents, we may safely enumerate the following, viz.:—1. The lime which is absorbed by the pores of the wood appears to alter or destroy the albuminous and saccharine principles, and, destroying the food of the worm, saves the wood from its ravages. 2. The two last elements, viz. the albumen and sugar, having been so acted upon by the lime, there is less apprehension of its being infected by the "dry rot." 3. The wood, soaked in lime water, becomes firmer in texture and more durable. It is the well-known property of waters holding lime in solution, called "*petrifying wells*," to penetrate and deposite upon all substances exposed to their influence small crystals of carbonate of lime. When wood is plunged for some time in a strong lime water solution a slight petrifaction of the wood is observable. The carpenter, who has to work up the wood taken out of the lime water pond, grievously complains that the edge of his plane is constantly blunted. This arises from the small crystals of carbonate of lime covering the surface of the wood; and also from their having insinuated themselves into the pores of the wood; the plane in contact with these has its edge taken off. Were the wood, prior to being put into the pond, smoothed with the plane, this objection of the carpenter would be prevented.

From these few observations upon Sir Charles Menteath's treatment of building timber, it must be apparent that no readier, more economical method of preserving wood has yet been discovered.

In preparing wood for the purposes of ship-building, we think it would be well worthy of the attention of the ship carpenter to ascertain by experiments, whether or not his wood, previously well steeped in strong lime water, would not give it *at sea* the same durability which it is found to have done, when so treated in buildings *on land.—Mark Lane Express.*

III. *The Consumption of Opium in China.*—It is assumed that there are 300,000,000 people in China, and that 33,320,000 taels of the smokable extract are imported yearly, making of "victimized smokers" 912,000, at the rate of 365 taels each, or 30⅓ pounds weight per annum, 2½ pounds per month, ¾ of an ounce per-day, or 1⅓ ounce per head for each and all of the immense population of China, from the remotest parts of Tartary and Bokhara to the sea; besides the native poison grown in the country, which is supposed to be not inconsiderable. Of the 300,000,000 in China, &c. more than one-half may safely be put down as children and youth; of the remainder one-half may be women, leaving, probably, not (much) more than fifty millions of men. Thus, supposing that all the men in China could and would use the drug, the number of the victimized, 1 in 912, is brought to 1 in 150; and from this enormous deduction must be made for the aged, sick, and poor, and for those too far removed from the head-quarters of the importers and sea-board to be able to obtain it at even enormous prices. It is, in fact, unlikely that it can as yet penetrate in large quantities much beyond the maritime provinces; and, if only their population is taken, it will be seen that the ratio of "victimized smokers" will be prodigious; though even allowing the validity of the argument, I can scarcely admire a defence resting solely on the fact that only a share has been contaminated, and not all! If a mace weight (nearly one drachm), would fill twelve pipes (which may be allowed to be "a tolerably good allowance" for each day) and if it be farther observed that (according to some accounts), the mace weight which has served a luxurious smoker to-day will supply the pipe of a more wretched slave to this habit to-morrow; then will 34,000 chests (the amount imported during the last year to which my information extends,) be abundantly sufficient to ruin the health and shorten the days of no less than 2,980,000 individuals. And if he who begins to use this baneful drug at twenty years of age can never expect to see his fortieth year, then what must be the average per annum of those who are cut off prematurely by the use of opium? The ordinary calculation is, unless my memory fails me, that, of sixty persons living and in health at the age of twenty, one may be expected to die every year. That is to say, the above-mentioned 2,980,000 persons who are living and in health at the age of twenty, would not, in the ordinary course of nature, be all dead in less than sixty years. If, on the contrary, in consequence of the use of opium, they all die in the course of twenty years, the rate of mortality is triple! and thus, within the space of twenty years, not less than 1,996,000 are murdered by the use of this pernicious drug; or 29,300 every year! I confine myself, in this calculation, to the effects of *imported* opium. At whose hands will the blood of all these victims to opium-smoking be required?—*Iniquities of the Opium Trade.*

IV. *Gentlemen Whips.*—The Age, when driven and horsed by the late Mr Stevenson, was an object of such admiration at Brighton, that a crowd was every day collected to see it start. Mr S. was a graduate of Cambridge; but his passion for the *bench* got the better of all other ambitions, and he became a coachman by profession,—and it is only justice to his memory to admit, that, though cut off in the flower of his youth, he had arrived at perfection in his art. His education and early habits had not, however, been lost upon him; his demeanour was always that of a gentleman; and it may be fairly said of him, that he introduced the phenomenon of refinement into a stage-coach. At a certain change of horses on the road, a silver sandwich-box was handed to his passengers by his *servant*, accompanied by the offer of a glass of sherry to such as were so inclined. Well-born coachmen prevail on this road. A gentleman connected with the first families in Wales, and whose father long represented his native county in Parliament, horsed and drove one side of the ground with Mr Stevenson; and Mr Charles Jones, brother to Sir Thomas Tyrwhit Jones, had a coach on it called the Pearl, which he both horsed and drove himself. The Bognor coach, horsed by the Messrs Walkers of Mitchel Grove, and driven in the first style by Mr John Walker, must also be fresh in the recollection of many of our readers; and Sir Vincent Cotton, one of our oldest baronets, now drives the Age, having purchased it from Mr Willan, who drove it, and who now drives the Magnet on the same road.

V. *Waste of Coals.*—Dr Buckland, in his Bridgewater Treatise, notices the disgraceful and almost incredible fact, that, during many years, more than a million of chaldrons of coals per annum, being nearly one-third part of the best coals produced by the mines near Newcastle, have been condemned to wanton waste on a fiery heap, perpetually blazing near the mouth of almost every coal-pit of that district (vol. i. p. 536); and adds, that this destruction, though diminished since the law of 1800, directing coals to be sold by weight instead of measure, still goes on to a frightful extent that ought not to be permitted; but he does not advert to what would be a far more easy and effective correction of the evil than the legislative interference he recommends—namely, the adoption in London of the plan constantly practised at Liege, Aix-la-Chapelle, &c., of mixing up the small coal with clay into balls, which, at less than half the price of large coal, give out in an open grate an intense and long-continued radiant heat, very superior to what new coals afford. If some speculative London brickmaker would import a cargo of the Newcastle small coals, and make it up into balls, and then shew by experiment, to the Society of Arts, or other public body, that as much heat could be got from a ton of clay-coal balls as from a ton of large coal, and that they could be sold at less than half the cost, and if, which is essential, this new article were duly puffed, and also patronised by patriotic individuals in the upper classes, so as to induce their poorer fellow-citizens to adopt it, there can be little doubt that a demand would soon arise for a large portion of the Newcastle small coal, now so improvidently wasted.

VI. *Sellers of Matches in London.*—With respect to match-venders, or streetological " timber-merchants," there are, including men, women, and children, about seven hundred who are to be found in and about the metropolis. Men and women, respectably dressed, may be seen standing in the obscure streets, at a distance from the glare of gas-light, with a basket or clean cloth, containing bunches of matches: these are the newly-initiated beggars, who carry a few bundles of matches, merely to avoid being taken by the officers of the Mendicity Society. The itinerant match-venders dispose of about 10s. worth per week each upon the average; the timber costing them about 8d. and the brimestone 3d.—say 1s. in all: thus then they have for labour of cutting and selling 9s. Admitting that they are sold in halfpenny worths, although many persons take two or threepenny worth at a time, while others only purchase a farthing's worth, each vender will supply 240 families, and the whole match-making fraternity will consequently supply 148,000 families weekly, and receive in the aggregate for that apparently useless and inconsiderable domestic article, a brimestone dipped stick, the immense sum of L.350. It is estimated that in London and its environs, not less than 1000 fathoms of wood are annually cut up for matches, and about three tons of brimestone consumed in dipping them.– *Streetology.*

VII. *Supply of Water for London.*—There are in London eight public water companies, namely, the New River, which supplies 73,312 houses with an average daily quantity of 241 gallons, at an annual charge of L.1 : 6 : 6 per house; the East London, 46,421 houses, with 120 gallons, at L.1 : 2 : 9; the Lambeth, 16,682 houses, with 124 gallons, at 17s.; the West Middlesex, 16,000 houses, with 185 gallons, at L.2 : 16 : 10; the Chelsea, 13,891 houses, with 168 gallons, at L.1 : 13 : 3; the South London, 12,046 houses, with 100 gallons, at 15s.; the Grand Junction, 11,140 houses, with 350 gallons, at L.2 : 8 : 6; and the Southwark, 7100 houses, with 156 gallons, at L.1 : 1 : 3.

VIII. *Tithe Commission—Hops.*—We take the earliest moment of giving publicity to the subjoined important document, issued by authority a few days ago, and dated the 17th of January last:—The Board have attentively considered the hop clauses, and on various points have taken the opinion of the law officers of the Crown. The following is the result:—1. That the separate rent-charge for hops includes the ordinary and extraordinary charge.—2. That the assistant-commissioner, on the requisition of any landowner, is to award the separate rent-charge, and to set forth the number of acres for which it is awarded.—3. That the separate charge is to be for the number of acres in cultivation at the time of making the award.—4. That the valuer is to determine by apportionment how much of the above shall be the ordinary, and how much the extraordinary charge, upon the said hop-grounds.—5. That both the ordinary and extraordinary charge will vary according to the varying price of corn.—6. That no separate valuation of hops can be made without notice from some landowner, in which case the notice will apply to the whole of the hop grounds in the parish.—7. That no extraordinary charge can be imposed by the instrument of apportionment, except in cases where, by agreement or award, the tithes of hop grounds have been separately valued, or the intention of the parties specifically declared. At the time of making an award or agreement, it sometimes happens that no notice is given of the wish of the parties to value the hop tithe separately, and to divide it into an ordinary and extraordinary charge. The law officers are of opinion that no part of the gross rent-charge so given will be liable to future decrease when hop grounds go out of cultivation; yet newly planted hop-plantations will always be subject to an additional extraordinary charge under the 42d section. Parties, therefore, who neglect to give notice for a separate valuation, and consequent division into ordinary and extraordinary charges on hop grounds, will be in this position:—When old hop grounds go out of cultivation, they will be relieved from no part of the rent-charge originally agreed on: when new hop grounds are planted, they will be subject to the addition of an extraordinary charge. It seems desirable that this fact should be distinctly impressed on all parties proposing to commute, without giving notice that they desire the hops to be separately valued, and the rent charge on them divided into ordinary and extraordinary. Parties who still persist in giving one gross rent-charge in parishes where hop grounds exist, should be very careful to have such hop grounds distinctly described in the plan and apportionment; or when, in after times, the parish is included in a hop district, and an extraordinary charge established for it, it may happen that such extraordinary charge will be claimed on all lands cultivated with hops when the original rent-charge was established, and the land-owner will find it difficult to prove the fact that the plantation existed when the agreement or award was made. Example in illustration of a case commonly occurring in hop districts:—Suppose the tithes to be commuted of a parish consisting of two acres, of which during the seven years,

One . . . . . (corn) paid 5s. to the rector;
One . . . . . (hops) paid 10s. to the vicar;

The two acres are now hops, and a separate rent-charge is required to be awarded. Answer:—Award 20s. as separate rent-charges for hops. Apportion 5s. as the ordinary charge payable to the rector, and 5s. to the vicar, and 5s. per acre as an extraordinary charge payable to the vicar.—*Kentish Gazette.*

IX. *Cure for Slug.*—A correspondent of the Northampton Herald states that the late continued rainy weather, with the wet summer which is past, have been particularly favourable to the propagation of the slug, which is now voraciously feeding upon those of our wheat crops which have been sown after clover or lays or beans, and made their appearance, almost threatening to annihilate the hopes of the farmer. This being an evil of vast importance, I hasten to inform you of a simple, cheap, and most efficacious remedy to destroy this formidable pest. This plan, which is found most successful, is to sprinkle slaked lime over the land—in the same manner as sowing broadcast—night and morning, for two or three days consecutively, when it will be found that the slug is destroyed by thousands. The lime, being dissolved by the moisture of the atmosphere, acts as a poison to these animals.

X. *Tanning.*—A discovery has been made which seems likely to revolutionize the trade. By means of a tanning machine or pair of horizontal rollers fixed over a tanpit, between which is introduced a belt or band of hides attached by ligatures to each other, to the number of 50 to 100, and by which the rollers are constantly fed or supplied, the hides are lifted out of the pit on one side of the machine; as they pass between the rollers, the exhausted ooze or tanning liquor is pressed out of them, and they are deposited in folds in the pit, on the other side of the machine, where they absorb another supply of fresh ooze. The first hide having been inserted between the rollers, the others follow in succession, and upon arriving at the end of the band the motion of the roller is reversed, and the belt is returned through the machine to receive another squeeze. This alternating motion is constantly repeated, the pit being replenished from time to time with fresh solutions of tan, till the operation is completed. The effects said to be produced by this plan, are—1st, The shortening the time of tanning to one-fourth of that generally required. 2d, The production of a considerable increase of weight. 3d, The leather tanned by this method resists water longer than that tanned by the old process. 4th, The new method is cheaper to work than the old. 5th, It is applicable to the existing tan-yards, at a comparatively trifling expense, with a capability of working in rounds or series, and of expending tan and liquor. 6th, It is available for all sorts of leather.

XI. *Important Turnpike Decision.*—On Monday last Mr Roger French, of Shutter's Oak Farm, Merriott, near Crewkerne, appeared before the bench of magistrates at Chard, on a summons issued at the instance of Mr T. Johnston, a lessee under the trustees of the Crewkerne turnpikes, to answer for having refused to pay the toll at the Merriott turnpike-gate for his team and waggon passing through, employed in drawing stone for draining land, Mr French claiming the exemption allowed for certain agricultural purposes. After a long argument before Mr Coles, the Rev. Dr Palmer, and two other magistrates, the bench expressed their unanimous opinion that the toll was payable.—*Dorset County Chronicle.*

XII. *Woollen and Glass Cloths.*—Our attention has lately been called to two new inventions—one American; the other, we believe, French; which seem likely to effect revolutions, of great though unequal importance, in the world of manufacture.

The American novelty is a machine by which woollen cloth of every sort is produced at less than a fourth part of the cost hitherto usual. The material is not *woven* but *compressed.* Two urchins, with the machine, can turn out 100 yards of the best broadcloth in twelve hours; and where 24s. were demanded per yard, *six* shillings afford the new manufacturers abundant remuneration. We have inspected and handled (as roughly as we liked) specimens of every variety, from the finest scarlet cloth for officers' uniforms, down to blankets and carpets, and we certainly could not, either by sight or touch, distinguish them from corresponding pieces made in the old fashion. We understand a large contract for army clothing has already been completed. It is impossible to calculate the extent to which this invention may ultimately affect us as a nation. In the mean time a vast number—many myriads of workmen must expect to be thrown out of employmént in Yorkshire, Gloucestershire, Wales, and other parts of the kingdom. The patentees are understood to be engaged in a series of experiments, the result of which, as they anticipate, will be the successful application of their principle to many departments, at least of the *cotton* manufacture. As to the woollen, they consider their triumph as already complete. A very large sum has been obtained for the use of the patentee's invention in France, and also in Austria, if not in other continental states; and we are told, though for this we do not vouch, that the American has disposed of his right in the United Kingdom, for the sum of *one hundred and fifty thousand pounds*, to a great house in Leeds.

The French device is of a very different sort, but must also have very remarkable results. Two specimens of this new manufacture were exhibited at the Marquess of Northampton's last *soiree*, as President of the Royal Society, and they then excited the curiosity and astonishment of the assembled *élite* of our philosophers. They were rich silk curtains, having all the appearance of being inwoven in gold and silver in most gorgeous patterns of Arabesque. They looked and felt exactly like the most splendid hangings of the Louis Quatorze taste; but their cost is a mere trifle in comparison, for the *gold* and *silver* are merely *woven glass.*

The Queen of the French and her daughters appeared at the last balls in the Tuileries in dresses manufactured upon this same principle, and there can be little doubt, that similar splendours will make their appearance at our own Queen's Drawing-rooms.

XIII. *A Cause of "Sturdy" in Sheep.*—Having long had opportunities of observing large flocks of sheep under different circumstances, I have come to the conclusion that the most general predisposing cause of this disease, is breeding "in and in," which although it may produce in some cases a more symmetrical animal, that animal will generally be found delicate and liable to diseases of the brain. Do we not see many proofs of the truth of this principle in the human species; are not the offspring of persons nearly related in blood, often of unsound or deficient intellect from birth? I do not pretend to be the originator of the idea, but as I never saw it mentioned in any treatise on sheep, I forward it to you; perhaps some other person will explain fully how the bad effects may be increased by improper food, such as turnip-tops, only (that is, without hay or other dry food) in wet weather, &c.—*Correspondent in Mark Lane Express.*

XIV. *Starch from Sago.*—Some time since, a communication came to John White, weaver, Bolton, from Mr John Hunter, Kirkmichael, regarding the substituting sago, in place of flour, in sow making, which is as follows;—"Do you know any thing of sago, as used for dressing, or sow, as you call it? Under the idea that you do not, I will tell you something worth knowing about it. We have dressed all kinds of warps in our house these two years with it, and find it answers well, being nearly one-half cheaper than flour. Enclosed is a specimen, we pay 3½d. per lb. here for it, but when I was in Bolton, I think I bought some in a shop in New Market Place at 2½d. per lb., but I did not then know its merits in dressing. As we are considered pretty good makers of it, the following is our recipe: Put a pound of sago in a delf dish; pour on it half an imperial gallon of cold water; let it stand and steep about two days, then pour another half-gallon on it; put all into an iron pot, and bring it to boil, stirring all the time it is on the fire; and when it has boiled about five minutes, pour into it, drop by drop, a tea-spoonful of vitriol (if you put the vitriol into it all at once, while boiling, it will spark out, and probably burn the maker), then boil it three or four minutes longer, when it will appear as thin as beef tea. You then pour it into a proper mug to cool, and after twenty-four hours it will appear firm and clear, and is then fit for use." White adds, "We have tried the above method of making sow at Mr Johnston's weaving shop, Sweet Green, Bolton, and find that less sow and less labour is necessary in making the yarn smooth. The weavers say it strikes into the yarn sooner than sow made from flour does. It will be seen by sizers, crofters, and starch-makers, that the same quality which makes it good for weavers is equally beneficial to them."

XV. *Wooden Under-drains.*—Seeing one of your correspondents at a loss with respect to wooden under-drains, I am induced to state the mode we have adopted, viz. to put on the *bottom* a wooden layer, the width of drain, and then to rest the other two pieces (in form like an aris gutter reversed), by which means the oozing of the soil from below is prevented, and care should be taken to keep the three pieces well together, which might best be done by just tacking them together before laid down, and afterwards laying a little straw on to prevent the crumbs of earth falling in. Alder is the wood we use, and the cost of sawing out and nailing together is about 6d. per rod; the width of the wood we use is about five inches and half inch thick, of course the laying down and covering up is but a small addition to the expense.—*Correspondent in the Mark Lane Express.*

XVI. *Destructive Effect of New Wheat on Sheep.*—In the month of September in the last year, a flock of sheep, more than 200 in number, strayed into a field where was a quantity of wheat that had not been carried in, in consequence of the unfavourable state of the weather. They had fed rather bountifully on it before they were discovered by the shepherd, when they were removed to the pasture on which they had previously been grazing, and no further notice was taken of them until the following day, when four of them were found dead, and several others were evidently ill. On the next morning, finding that twenty-eight had already died, and nearly as many more were almost dead, the owner sent for the veterinary surgeon, as is too frequently the case, when it was too late to be of much service.—*Veterinarian.*

XVII. *Sir W. Burnet's Process for the Prevention of Dry Rot.*—The process consists in applying a solution of muriate of zinc to the cloth or other substance to be preserved. It is very much cheaper than where preparations of mercury are used; and to shew how well it acted, Dr Reid exhibited two sets of specimens, in every respect alike, of soldiers' cloth, sail-cloth, ropes, &c., which were placed and kept a year in one of the dampest cellars in Somerset House; the one set being in their natural state, and the other impregnated with the muriate of zinc, and while the former were quite rotten, and had lost their colour, and were easily torn to fragments, the latter were as fresh in colour and as strong in texture as when they were put in. It is understood that a patent has been taken out to secure this valuable invention.—*Society of Arts' Exhibition, Edinburgh.*

XVIII. *French and English Agriculture.*—As the agricultural question is now exciting much interest in France and England, owing to the high price of corn, and the beet-root question, a few facts on the subject will, most probably, be read with interest. In Great Britain the agricultural population is estimated at 5,200,000, which is less than one-third of the population, which we take to be 18,000,000; whereas, in France, the number of persons employed in the same occupation is rated at 22,000,000, out of a population of 35,000,000, thus making nearly two-thirds of the whole. The soil of England is estimated at 13,000,000 hectares, that of France at 41,000,000. Thus, to cultivate three times the extent of soil in France, more than four times the number of persons occupied in England are employed. It is, however, but just to observe, that plenty depends more on good cultivation than extent of soil. Great Britain, with its 5,000,000 agriculturists and 13,000,000 hectares of soil feeds 17,000,000 inhabitants; France with 22,000,000 cultivators, and 40,000,000 hectares of soil, only feeds double the number, and the quality of French produce is much inferior to that of England. The following table will shew more positively the agricultural superiority of England over France, and how much greater development and currency the agricultural produce has acquired in one country than the other:—

	Great Britain with 13,000,000 hectares of soil, and rather more than 5,000,000 labourers, produces annually.		France with 40,000,000, hectares and 22,000,000 labourers, produces annually.
Corn	46,000,000	hectolitres	153,000,000
Horses	170,000	....	40,000
Oxen	1,200,000	....	800,000
Sheep	10,200,000	....	5,200,000

Now France with its extent of soil, and with two-thirds of the number of its population employed in agricultural pursuits, should produce three times as much as England. A distinguished French publication asserts that 75 families out of 100 in France are occupied by agriculture, whereas in England the proportion is 28 to 100. It must certainly be gratifying to England to see that nevertheless it produces relatively much more than France.

XIX. *Diseases in Sheep.*—There is a disease in sheep, which, at certain times, is very injurious, and few appear to know how to cure it; it frequently occurs in the early part of the summer, particularly after the sheep have been kept hard during the winter, and before they can recover their condition. The sheep appear, when attacked, to be labouring with inward fever, attended with cough, which produces swollen lips, completely cased with a thick scab. The best remedy, and which will generally produce an effectual cure, is by pulling off the scab, which will cause the lips to bleed, then rubbing them well with prepared oil, and afterwards anointing them with the prepared salve. This method has been known to cure eighty out of a hundred sheep the first time they were dressed, and on a second application scarcely ever attended with want of succes. This ought to be known to all flock masters. *Recipe for the Prepared Oil.*—½ pint of linseed oil; ½ pint of elder oil; 1 oz. of verdigris. Those three articles to be used as oil. *Recipe for the Prepared Salve.*—¼ lb. of fresh butter; 1 oz. of verdigris; 1 oz. of rosin; ¼ lb. of Venice turpentine; ½ oz. of alum; 2 table-spoonfuls of tar. The above six articles to be simmered together, and used as ointment.

XX. *Lockerbie Sheep Show.*—The highest premium at the Lockerbie sheep show, on April 16. 1840, for the best score of cross-bred (Cheviot with Leicester) hoggs fed together, was awarded to Mr Wilkin, Tinwald downs. The best sheep in the lot weighed, when alive, 157 lb., and the average was about 139¼ lb., indicating about 20 lb. per quarter of mutton. They were 10 lb. heavier than those exhibited at any former show, and doubtless they were the best sheep of the same age and breed ever shewn in Scotland, or perhaps even in England. Mr Wilkin's 20 hoggs had been kept in a shed and court since 25th November. The average increase of live weight during that period on each sheep was 48¼ lb. He mentioned that the daily weight of turnip for each sheep was 17 lb., and that the whole cost of grain and oilcake for each was about 7s. 6d. The increase of value was estimated from 22s. to 25s., affording a considerable presumption in favour of house-feeding. Mr John MacBryde, of Belkar, during the month of December 1838, tied up a number of sheep, of the Leicester breed, in stalls, and fed them on turnips, rice, sago, sugar, and linseed oil. At first they were rather unruly, but shortly became quiet, and did exceedingly well. In December 1839, he tried the same experiment with a lot of white-faced wethers. He gave them daily one and a half pound of linseed, with as many turnips cut up in small pieces as they could eat, and the experiment has far exceeded his expectations. The quality of the mutton is of the finest description; and the wool, by being sheltered from the heavy rains one day and the scorching sun another, is soft and fleecy, and far superior to that on the same kind of sheep which have been field fed. Another great advantage that the stall possesses over the field feeding, is preservation from the diseases which the damps and vicissitudes of the weather often engender. The whole of the lot have been bought by Mr Boyle, flesher here, on Saturday last, and so high is his opinion of their excellence, that he has paid nearly 7s. per head more than for those that are field fed. Mr MacBryde says, the present lot has been exceedingly prosperous, but that of the Leicester breed was more so; and that although at first in the stall they consumed a greater quantity of turnips, yet in the end there was a great saving, as they did not require nearly so many as they would have done if in the field. The nutritious qualities of the linseed have made the mutton of the very richest sort; and we doubt not but many farmers will be inclined to try the experiment, as during both seasons those tied up in the stalls were exceedingly healthy, far superior to the lot from which they were taken at random, and required but little tending. The first Mr Boyle killed of this lot was sent to Lord Stair, and weighed 82 lb. mutton, and 18 lb. fat.—*Dumfries and Galloway Courier.*

XXI. *Potatoes Raised from Cuttings.*—Mr Cotselt, of Stapleton, near Bristol, has succeeded in raising this valuable root from cuttings. Mr Cotselt says, "Reasoning upon the analogy of the potato to the dahlia, I was induced in the spring to try an experiment on cuttings, and have succeeded admirably, having, from white apple and Fox's seedlings, an early potato, produced a good crop of full-sized potatoes, many of which weighed half a pound. The method was this:—When the potatoes were about nine inches high, I cut off the tops about six inches long, planted them in a line about eight inches apart, with a flat dibble, pressing the earth carefully against them, gave them water, and afterwards hoed them as an ordinary crop. I produced this way at the rate of 140 lb. per rod." The deficiency in the wheat crop, and the consequent high price of bread, must cause a more than usually large demand for potatoes; and if, by means of this plan, one-half the quantity of seed can be spared for the purpose of food, Mr Cotselt will richly deserve the thanks of those to whom an abundant supply of potatoes is of such vital importance.—*Wiltshire Independent.*

XXII. *New Breeds of Sheep.*—Captain Glasspoole is endeavouring to create a new breed between the Abyssinian sheep, whose coat is black hair, and the Leicester. The one exhibited was a very handsome animal; his coat a mixture of black, or rather brown, wool and hair. Captain Glasspoole has some ewes of the same cross, and intends to continue his attempt to farther extent. The sheep weighed 13¼ stones. It had not been fatted for exhibition and slaughter. We heard a very excellent judge express an opinion of the difficulty of creating a separate breed upon which dependence could be placed; for a time, perhaps, the breed preserves its new character, but nature suddenly reproduces the character of the original stock, and thus defeats almost all the previous care and experiment of the breeder. However they may terminate, such experiments ought to be encouraged, for it is mainly to the promotion of such attempts that Norfolk is indebted for the character of the first agricultural county in the world.—*Norwich Mercury.*

XXIII. *The Plantagenets.*—Fulke, Earl of Anjou, having been guilty of some crime, was enjoined, by way of penance, to go to the Holy Land, and submit to castigation. He acquiesced, habited himself in lowly attire, and as a mark of his humility, wore a sprig of broom in his cap. The expiation being happily finished, Fulke adopted the name of Plantagenest, from the Latin name of the broom, *Planta-genesta.* His descendants continued the name, and many successive nobles of the line of Anjou distinguished themselves by decorating their helmets with this plant. The arms of Richard I. were "two lions combatant." Crest, a plantagenista, or broom sprig. Upon his great seal, a broom sprig is placed on each side of his throne.—*Sandford's Genealogical History.*

XXIV. *Ginseng.*—The greater number of Chinese medicines are derived from the vegetable kingdom. The root of one, the stalk of another, the fruit of the next, the flowers of the fourth, are each carefully collected and dried for the service of the invalid. But these people consider the ginseng as superior to every other medicine on the face of the globe. Its name, ginseng, jin-chen, or mindin, signifies "the wonder of the world;" or, "the dose for immortality." Hence the name which has been applied to it by our systematic botanists is the *Panax quinquefolius.* It has been said by Pèr Jartroux, that the most celebrated physicians of China have written volumes on this root alone. Ginseng is very scarce in the empire of China, the only places where it is found being in the mountains of Shan-tung and Leao-tong. The chief supplies, with the exception of those obtained from America, from which country it is now abundantly exported to China, are procured from Tartary, where it is considered of such importance, that the deserts where it grows are strictly guarded, and heavy fines and punishments are inflicted upon those who trespass upon the grounds, or are detected in the act of unlawfully digging up the roots. No plant has, perhaps, received so much attention, or has enjoyed so long and permanent a fame. It is asserted, that at one time the emperor wished to monopolise the trade in this wonder-working root, and actually sent out a body of Tartars to dig it up. After a search of six months they returned, having collected but the very small quantity of twenty thousand pounds weight. It was formerly worth eight and ten times its weight in silver, but it is now frequently adulterated with other roots. The *Panax fructicosus*, and another plant, *Chyn-len*, supposed to be the *Ophiorhina mungos*, are frequently made to supply its place. But, however adulterated it may be, among the Chinese it is in general request. They mix it in their tea and soup, and take it with their usual meals, night and morning. As it is a powerful stomachic, it must tend to invigorate the stomach, and take off, in a great measure, the injurious effects which might otherwise follow from the habitual use of tea and opium.—*The Fanqui in China.*

XXV. *Gaudin's Light.*—The newly-invented light of M. Gaudin, on which experiments were recently made at Paris, is an improved modification of the well-known invention of Lieutenant Drummond. While Drummond pours a stream of oxygen gas, through spirits of wine, upon unslaked wine, Gaudin makes use of a more ethereal kind of oxygen, which he conducts through burning essence of turpentine. The Drummond light is fifteen hundred times stronger than that of burning gas; the Gaudin light is, we are assured by the inventor, as strong as that of the sun, or thirty thousand times stronger than gas, and, of course, ten million times more so than the Drummond. The method by which M. Gaudin proposes to turn the new invention to use is singularly striking. He proposes to erect in the island of the Pont Neuf, in the middle of the Seine and centre of Paris, a light-house, five hundred feet high, in which is to be placed a light from a hundred thousand to a million gas-pipes strong, the power to be varied as the nights are light or dark. Paris will thus enjoy a sort of perpetual day; and as soon as the sun of the heavens has set, the sun of the Pont Neuf will rise.—*Mechanics' Magazine.*

QUARTERLY AGRICULTURAL REPORT.

May 1840.

For nearly three months,—that is eleven weeks,—from the middle of February to the second week of May, the weather was so remarkably fine for the prosecution of field labours,—moderate temperature during night and day, and pleasant sunshine throughout the day, that we remember of no spring of a similar character. With the exception of night now and then, the temperature did not reach the freezing point; still it was sufficiently low every night for the deposition of a copious dew. The sunshine, though generally cloudless, was neither bright nor scorching, but mollified through a thin haze, and thus rendered pleasant both to the feeling and the eyesight. There were no rainy days, though occasional showers fell in the night, and when these were awanting, mists came up from the sea, which so bedewed the trees that it descended from the twigs and down the stems like rain. Even with all these encouragements to vegetation, the leaves of trees evolved themselves with caution. The plane and horse-chestnut expanded beautifully into full leaf, and the latter has already passed through its season of florification. The beech and the lime felt disinclined to exhibit their expanded beauties. The orchard fruit-trees, the geen, the pear, and the apple, indicated a rich display at no distant period. The daily sunshine by degrees heated the ground, and indications of approaching heat manifested themselves, such as an occasional hot day, dusty roads, calm atmosphere, and little active whirlwinds carrying up the dust of the roads. The wind continued steadily from the west, with occasional sea-breezes for a few hours in the day, the barometer continued high verging to 30 inches, and the thermometer about 50° on the average. Springs began in many places to fail, the rivers to shrink into a diminutive size, the shallow wet-bottomed land to become very dry, and the bogs and moors to feel hard under foot. The latter were in a most excellent state for the incubation and hatching of all kinds of wild fowl, and the smaller tribes of the passerine birds have likewise had a joyous season for the bringing forth of their young. We have thus entered particularly into the state of the weather, in order to record the nature of this remarkable spring.

The gentle frosts of winter had rendered the land so easy to work, that the seed-time in the fine weather was carried on with celerity and finished to perfection. The bean land has been worked in a style that it has not been for some seasons, and the consequence has been, as we understand, that a large breadth of that crop has been sown this season. All the land that had not been sown in autumn with wheat, on account of its continued state of wetness, and had been intended for barley, was enabled to be sown with spring wheat, and of this species of crop an unusual extent of land appears this season. The mellow state of the lea furrow soon enabled the oat seed to be gone through. The barley land, whether after potatoes on light soil, or turnips in spring, was seed furrowed with a very firm deep tilth. The grass seeds were sown in the finest condition among the autumnal wheat, and its harrowing in after spring wheat and barley produced the finest finishing that has been seen for many a year. The roller has been busy at work this season, whether among the autumnal wheat, or the spring wheat and barley land, among the new grass or lea oats, and its work was of essential service in such a dry season as this at so early a period in assisting to keep out the effects of drought. Meantime the cross stirring of the potato and turnip land was not neglected, though it was not attended to before it was required, inasmuch as the threatening aspect of the weeds portended as much work as the length of the season would admit of being performed, notwithstanding the unbroken nature of the weather. Those who were active in taking advantage of the cleansing state of the weather, got their land as clean for the potato and turnip, as in most seasons the bare fallow is got cleared. From the impossibility of getting the land thoroughly cleaned for potatoes, in usual seasons, that species of crop is any thing but a cleanser of the ground, and when land is laid down to grass after it, it is generally broken up in a very foul state. This remark especially applies to land that is not altogether suited to the potato culture, but which is nevertheless made to grow that universal esculent. Most of the potatoes are now planted, though in the late districts some have yet to be put into the ground. On account of the subsequent rain, we are rather inclined to think that the late planted this season will have the best chance of becoming the most equal crop. The land was pretty dry when the earliest part of the crop was planted, and yet it was not so dry as to impress one with the idea that it was scorched with drought, for the bottom of the ploughed up furrow always indicated moisture. This circumstance, amidst so much dry weather that in all April there was not a shower, may no doubt be explained by those two facts—one, that the land had been so thoroughly saturated with rain until the beginning of February, that a long tract of dry weather even in the midst of summer would be required to dry it throughout; and the other fact that the fine tilth of the surface, occasioned partly by mellowing frosts, and partly by the drying influences of the sun and air in spring, would serve as a powerful non-conductor against the penetrating influence of heat or drought.

As might be expected, after considering all these united favourable circumstances, the growing crops are looking well. The autumnal wheat are not too thick. The unkindly bed it received at seedtime, and the subsequent drenching which it got in winter, might have endangered its existence, did we not remember that wheat takes with a damp seed bed, and that when it receives nourishment at its roots, it can withstand pretty rough usage in its leaves and stem. This has been a favourable season for its tillering, and on hard land such a process was requisite to fill up the ground with plants. The braird of the spring-sown crops was strong and healthy, though in dry situations all the oats and barley seed did not braird at the same time, much of it not appearing above ground until rain came. The young grass where not eaten looks well and growthy, though in many places there is very little clover left. It had no doubt perished in the rains of winter. What of it had been eaten became very bare pasture for stock; for it must be observed in regard to this particular part of our subject, that however fine the spring was for the advancement of field labour, and however pleasant to the feelings, it was by no means propitious to vegetation; that advanced very gradually, and when, of course, the number of mouths was multiplied on any given space of new grass, the young plants would be diminished of their fair proportions, whenever the consuming power exercised by the increasing number of mouths exceeded the power of vegetation, when retarded by the state of the atmosphere. The season being much earlier than that of last season, the turnip crop stood out its desired period. There is a superplus of potatoes which the farmers are disposing of rather than give to the feeding cattle, as these were readily disposed of at good prices, at an early period. This lambing season has been a good one, and inasmuch as dry weather is an excellent nourisher of lambs, it must have been particularly good. We allude especially to the lambing season of the low country; that of the high country had been interfered with by the change of weather, though a good part of that very anxious season had been gone through before the change took place. We understand that black-faced lambs have shewn great weakness after being lambed, many never having been able to get to their feet, and subsequently dying. We hear of no cause being assigned for this state of debility. There must, however, be a cause for it, and not an unlikely one, as we conceive, may be found in the continued wet state in which the ewes were kept last autumn and winter after being in lamb. The wet state of the pasture would neither be nourishing to the ewes, nor would the ewes themselves, by reason of the wet state of the weather, be in a strong enough state to support the lamb well during the period of gestation. We observe that complaints exist in England of the loss of ewes in great numbers after lambing. No particulars of the state in which they had been kept during winter have been given. We have, therefore, no sufficient data to judge of the particular cases complained of; but as mortification is said to have ensued, we should be inclined to suspect that the ewes had got too much Swedish turnip in winter. Ewes are not unfrequently folded on Swedish turnip on the land, for the purpose of bringing the milk on them.] Two evils are constantly attendant on this practice to *ewes*:—being folded on the land, they eat more turnip than is good for them, for they eat to the laying on of fat; and Swedish turnip is not the most proper ingredient for bringing milk on either ewes or cows, its tendency being, especially in spring, to lay on fat rather than produce milk. Ewes should get no turnips in winter, and the only time they should taste them, should be about three weeks before they lamb; and then not on the *turnip* land at all, but on lea-ground, either in whole, to which they may go to and fro at will, or what is better, cut into troughs, twice or thrice a-day in small quantities, and in either case not so much as they can eat. Swedish turnip given to ewes in the earliest part of the period of their gestation, lays fat on their kidneys; for it is well known that internal fat is laid on before external, and which fat in which situation prevents the due growth of the lamb or lambs, hence fat ewes drop small lambs. When it is given to them after they are more than half gone with young, the lamb and fat grow simultaneously, and when the birth takes place, either naturally or by assistance, and it is seldom that Leicester ewes can lamb without some assistance, the fat becomes crushed, internal inflammation ensues, and consequent mortification. The ewe won't own her lambs, she will not get up on her legs, the breathing becomes heavy from the sympathetic action of the diaphragm on the lungs, and she dies. When Swedish turnip is not given to ewes until within a very short period of their lambing—say three weeks,—and then not so much as they can eat, the lambs occupy so much of the abdominal capacity, there is no room for the deposition of fat on the kidneys, and their juice at that late period of gestation is appropriated to the formation of milk. All this we have found out by dear-bought experience. We think oil-cake an excellent thing to give to ewes a short time before and after lambing, as in the case of cows before and after calving. It assists in the parturition, and is an excellent cleanser of the womb of all the after discharges for nine days after parturition. There is at present a complaint of au epidemic among cows in England, which it seems has come from the Continent. It has not yet reached Scotland, though the probability is it will. Our friend Professor Dick is on the outlook for it, and whether it appears in this country or not, he will, we hope, favour our readers with his sentiments on the subject.

The weather has experienced a very considerable change since May commenced. The wind veered all of a sudden to the north-east, and has continued ever since to make good its quarters from north to the south-east. As may be expected from such a quarter, the temperature of the air has experienced a considerable diminution, although the increase of cold is indicated in this case more from the feelings than the thermometer. There have been no dashes of rain,—the heaviest falling in the night, and occasional showers in the day. The rivers have come down now and then pretty full, but not so of long continuance. The higher hills have again been powdered with snow, and even storms of thunder and lightning have been heard in the mountains. Cool breezes have blown from the sea, accompanied with dense wetting fogs, which have rendered the navigation of the coast somewhat dangerous. Blighting hard breezes have also come from the coast, which have had the effect of shrivelling the young leaves of the trees looking to the east; and also of blackening the apple and pear blossoms on that side, so as to render it probable that the fruit will be destroyed on that side of all fruit-trees which was exposed to the blasts. However, though the wind still continues in the east, which is no matter of wonder in the month of May, the sun begins to peep out again,—the air assumes a balmy aspect,—and the buds of the oak and ash are pushing into leaf. The account of the weather in France and England is favourable, and no doubt we shall soon experience the same benefits of good weather in Scotland.

The corn-markets have been very steady for some weeks, the prices only varying from 68s. 1d. to 69s. 6d. per quarter for wheat. The aggregate average of the six weeks, ending 8th May, was 68s. 8d., which imposes a duty of 16s. 8d. per quarter. There has of late been a considerable import of foreign wheat into Leith, most of which, as we understand, pays the duty as it is landed,—a fact indicative of the opinion of the importer, either that prices will not rise much in our markets during the summer, or that they will not rise more than the difference that will be experienced in the amount of the import duty during summer; which would render the payment of duty at present a safe speculation. We dare say this conjecture is quite right. From all that we can learn and observe, there is more wheat in the hands of farmers in the agricultural districts this year than at the same period last year. This is the opinion of the Bankers' Circular, a paper which usually gives very shrewd remarks in regard to the corn trade. Of this, at least, we are sure, there are many more wheat-stacks standing in the stack-yard just now than last year at this time; and, though the yield of each may be a little less, what with those, the surplus potatoes, and the earlier season,—which of itself will save at least one month's consumption of the crop of 1839,—we apprehend no scarcity whatever before next harvest.

The corn-law agitators still continue their ungracious work. Their advocates in Parliament are either sad bunglers of their business, or they are afraid to display their numbers in that arena. Although the weapons which those agitators use are unusual in the ordinary warfare of words; still, unless the agricultural interest condescend to wield the same sort of weapons as are used against them, it is not improbable they may be disarmed before being aware of the perilousness of their situation. The method of employing itinerating lecturers and cheap circulars by the agitators in support of their views, must also be adopted by the agriculturists, and nothing but money is requisite for the purpose; for many, we have no doubt, are quite ready both to speak and write in favour of the agricultural interest of this country, and against the views of the agitators, provided they were requested and assisted to do it. Thousands of pounds have been subscribed by the manufacturers in England and Scotland, to keep their system of agitation in motion; let thousands of pounds also be draise by the landed interest to counteract their plans, and there is not the least fear but that *truth* and reason will at length prevail. The falsehoods propagated by the agitators in wholesale pass for truth with the unthinking portion of the community, if left uncontradicted; but let those falsehoods be exposed,—let them be proved to be falsehoods, by incontrovertible data,—and then they will either cease to be uttered any more, or they will cease to take hold of the public mind.

The Central Society of London for the Protection of Agriculture has undertaken to organise the machinery by which the system of agitation is to be counteracted; and a way is thus presented to individuals to give their support to the greatest advantage. There is one way in which we propose to support this Society, and that is, by drawing up an *exposé* of all the arguments that can be brought forward in support of or against corn-laws. For our readers must remember, that the grounds of controversy on this question are now much narrowed. The question is not now, Whether this or that system of corn-laws is the best? but, Whether any protection at all shall be given to our own agricultural industry? The inquiry is, therefore, a vital one, and should be conducted with all the seriousness that the momentous nature of the subject demands, and we hope we shall do it to good purpose.

TABLES OF

The Average Prices of the different kinds of GR
Marke

LONDON.													
Date.	Wheat.		Barley.		Oats.		Rye.		Pease.		Beans.		
1840.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	
Jan. 31.	68	2	41	5	24	8	38	6	39	8	39	2	
Feb. 7.	67	2	42	3	26	2	37	6	40	8	38	5	
14.	69	11	41	10	26	9	36	6	40	6	39	2	
21.	69	4	42	2	25	3	37	4	40	2	39	4	
28.	69	9	41	5	25	5	38	0	40	0	39	5	
March 6.	70	0	42	11	26	3	38	6	39	6	38	8	
13.	71	10	40	8	27	1	37	6	39	8	39	8	
20.	72	10	42	8	27	1	37	4	39	10	39	6	
27.	73	9	41	6	26	4	38	0	40	4	39	8	
April 3.	68	10	41	4	25	11	37	6	40	10	39	5	
10.	66	5	39	10	25	4	36	6	41	6	40	8	
17.	72	0	43	0	24	7	37	8	40	8	40	1	
24.	72	10	41	4	24	10	38	2	41	8	40	3	

LIVERPOOL.												
Date.	Wheat.		Barley.		Oats.		Rye.		Pease.		Beans.	
1840.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 31.	65	9	35	2	25	6	38	5	44	2	45	9
Feb 7.	65	2	36	3	25	9	38	0	45	6	44	9
14.	59	3	36	10	24	4	37	4	43	2	42	10
21.	70	4	33	5	25	10	37	6	40	8	43	10
28.	70	8	43	1	25	8	38	0	40	6	47	9
March 6.	69	9	43	0	25	7	38	4	39	8	45	3
13.	69	4	43	10	26	9	37	8	40	10	44	0
20.	70	11	40	8	28	2	37	10	41	6	44	10
27.	70	2	37	1	26	2	38	6	40	4	43	8
April 3.	68	5	41	9	25	7	38	10	40	2	43	9
10.	67	6	36	5	26	10	39	2	41	4	42	7
17.	65	8	39	4	26	8	38	6	40	10	44	4
24.	68	0	44	1	26	7	38	2	41	6	47	0

TABLE showing the Weekly Average Prices of
IV. c. 58, and the Aggregate Averages which r
the Duties payable thereon, from February to

Date.	Wheat.						Barley.						Oats.			
	Weekly Average.		Aggregate Average.		Duty.		Weekly Average.		Aggregate Average.		Duty.		Weekly Average.		Aggregate Average.	
1840.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 31.	65	2	65	10	21	8	39	0	39	7	3	4	23	10	23	11
Feb. 7.	64	11	65	7	21	8	38	3	39	2	3	4	24	0	23	11
14.	65	3	65	5	21	8	38	3	39	0	3	4	24	2	23	11
21.	65	11	65	5	21	8	38	4	38	10	4	10	24	3	23	11
28.	66	4	65	6	21	8	38	0	38	7	4	10	24	6	24	0
Mar. 6.	66	11	65	9	21	8	38	11	38	6	4	10	25	2	24	4
13.	68	2	66	3	20	8	38	11	38	6	4	10	25	8	24	7
20.	69	3	67	0	18	8	39	7	38	9	4	10	26	1	25	0
27.	69	1	67	7	18	8	39	9	39	0	3	4	26	2	25	3
April 3.	68	7	68	1	16	8	40	0	39	3	3	4	25	9	25	6
10.	68	11	68	6	16	8	39	11	39	6	3	4	25	2	25	8
17.	69	6	68	11	16	8	40	9	39	10	3	4	25	1	25	8
24.	68	7	69	0	13	8	39	11	40	0	1	10	25	4	25	7

The MONTHLY R
Corn, Grain, Me
upon which dutie
tities remaining i

Quar-
hewing

Month ending	From Foreign Countries.		Decrease
Feb. 5. 1840.	Qrs.	Bu	
Wheat, . .	45,557	2	
Barley, . .	60,419	0	£
Oats, . . .	2,583	2	. .
Rye, ...	61	4	. .
Pease, . . .	4,718	3	12,590
Beans, . .	13,104	4	. .
			310,000
Totals,	126,443	7	. .
March 5.			322,590
Wheat, . .	44,812	2	
Barley, . .	80,709	3	
Oats, . . .	2,967	7	
Rye, ...	. .		
Pease, . . .	2,142	1	
Beans, . . .	6,774	3	
Totals,	187,406	0	
April 5.			
Wheat, . .	55,676	4	
Barley, . .	62,759	8	
Oats, . . .	7,903	6	
Rye, ...	. .		
Pease, . . .	5,187	5	
Beans, . .	7,025	7	
Totals,	138,553	1	
Feb. 5. 1840.	cwt. qr. lb.		
Flour, . . .	43,634 1 14		
Oatmeal, .	. .		
Totals,	43,634 1 14		
March 5.			
Flour, . . .	80,472 2 7		
Oatmeal, .	. .		
Totals,	80,472 2 7		
April 5.			
Flour, . . .	55,738 2 1		
Oatmeal, .	185 1 16		
Totals,	55,923 3 17		

nd Year

. Imp. Qr.

RIES.

. . . . 47/2
. . . . 30/10
. . . . 28/
. . . . 22/2
. . . . 23/4
. . . . 42/8
. . . . 34/10
. . . . 47/
b. . . . 20/7½

JRGH. .

. . . . 56/
. . . . 50/
. . . . 34/8
. . . . 31/
. . . . 28/
. . . . 24/8
. . . . 20/
. . . . 38/
. . . . 15/6

MORAY.

	SMITI *Per Sto*
Date.	Beef.
1840.	
Feb.	6/6 to 8/
Mar.	6/6 8/6
April	7/3 8/

. . . . 65/
. . . . 37/4
. . . . 24/2
. . . 41/1
. . . . 38/3
. . . . 16/1

HIRE.

. . . . 38/11½
En 36/11½
. . . . 28/7
Merino, ... 26/7
In Grease, ... 22/9½
South Down, ... 36/2
Leicester, Hogg, ... 29/0½
Ewe and Hog 52/3
Locks, ... 19/11½
Moor,

TABLES OF PRICES.

***ETURNS**, published in terms of 9th Geo. IV. c. 60, **shewing the Quantities of** **al, and Flour imported into the United Kingdom in each Month; the Quantities** **have been paid for home-consumption, during the same Month; and the Quan-** **Warehouse at the close thereof, from 5th Feb.** 1840 **to 5th April** 1840.*

IMPORTED.		CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu	Qrs. Bu
. .	45,557 2	4,995 6	. .	4,995 6	178,260 6	161 4	178,422 2
. .	60,419 0	61,413 7	. .	61,413 7	125 7	. .	125 7
. .	2,583 2	1,101 0	. .	1,101 0	13,451 5	. .	13,451 5
. .	61 4	56 3	. .	56 3	3,041 4	. .	3,041 4
. .	4,718 3	5,666 0	. .	5,666 0	2,815 1	. .	2,815 1
. .	13,104 4	13,104 5	. .	13,104 5	700 6	. .	700 6
. .	126,443 7	86,337 5	. .	86,337 5	198,395 5	161 4	198,557 1
. .	44,812 2	7,660 0	. .	7,660 0	215,581 0	161 4	215,742 4
. .	80,709 3	80,515 2	. .	80,515 2	374 1	. .	374 1
. .	2,967 7	96 1	. .	96 1	14,178 3	. .	14,178 3
. .	. .	. .	. .	. .	3,041 4	. .	3,041 4
. .	2,142 1	2,089 7	. .	2,089 7	2,673 6	. .	2,673 6
. .	6,774 3	4,790 5	. .	4,790 5	2,654 5	. .	2,654 5
. .	137,406 0	95,151 7	. .	95,151 7	238,503 3	161 4	238,664 7
. .	55,676 4	5,377 2	. .	5,377 2	263,059 2	161 4	263,220 6
. .	62,759 3	54,426 4	. .	54,426 4	5,066 5	. .	5,066 5
. .	7,903 6	114 0	. .	114 1	21,492 4	. .	21,492 4
. .	. .	140 0	. .	140 0	2,901 4	. .	2,901 4
. .	5,187 5	2,075 5	. .	2,075 5	5,729 6	. .	5,729 6
. .	7,025 7	1,513 5	. .	1,513 5	8,167 0	. .	8,167 0
. .	138,553 1	63,647 1	. .	63,647 1	300,416 5	161 4	306,578 1
cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
2,046 2 0	45,680 3 14	5,893 0 8	1,027 3 18	6,920 3 26	161,546 1 17	5,727 1 9	167,273 2 2
. .	. .	. .	. .	. .	15 1 8	. .	15 1 8
2,046 2 0	45,680 3 14	5,893 0 8	1,027 3 18	6,920 3 26	161,561 2 25	5,727 1 9	167,289 0 6
1,945 0 9	82,417 2 16	3,985 2 23	2,067 0 2	6,052 2 25	221,105 3 10	5,361 2 16	226,667 1 26
. .	. .	.	. .	. .	15 1 8	. .	15 1 8
1,945 0 9	82,417 2 16	3,985 2 23	2,067 0 2	6,052 2 25	221,121 0 18	5,361 2 16	226,682 3 6
19 2 24	55,758 0 25	8,204 1 24	928 2 13	9,133 0 9	261,727 1 8	4,652 2 27	266,380 0 2
. .	185 1 16	. .	. .	. .	48 0 4	. .	48 0 4
19 2 24	55,943 2 13	8,204 1 24	928 2 13	9,133 0 9	261,775 1 7	4,652 2 27	266,428 0 6

PRICES of BUTCHER-MEAT.

FIELD, e of 14 lb.	MORPETH, *Per Stone of* 14 lb.		EDINBURGH, *Per Stone of* 14 lb.		GLASGOW, *Per Stone of* 14 lb.	
Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
6/3 to 7/6	6/6 to 7/6	6/9 to 7/9	6/3 to 7/6	6/6 to 7/9	6/9 to 8/	6/6 to 7/9
6/6 8/	6/9 8/6	6/6 8/	6/6 8/	6/9 8/3	6/6 7/9	6/9 8/
6/9 7/9	6/9 8/	6/9 8/3	6/ 7/6	6/6 8/	6/6 7/6	6/6 7/9

PRICES of English and Scotch WOOL.

LISH, per 14 lb.

. .	23/6 to	25/
. . .	20/	24/
. .	21/	25/
. . .	16/	20/
. .	13/6	15/6
. . .	7/6	9/6
.	7/	8/6

SCOTCH, per 14 lb.

Leicester, Hogg, . .	16/ to	20/6
Ewe and Hogg, . . .	14/	18/
Cheviot, white, . . .	15/	18/
Laid, washed, . .	10/	15/
Unwashed, . .	6/	9/6
Moor, white, . . .	6/6	8/6
Laid, washed, . . .	5/	8/
Unwashed :	4/6	5/6

---

exp
wo
dar
ser
tric
the
mar
are
last
less
of i
we
T
voc
afra
thos
unle
pon
befo
emp
port
thin
doul
ral i
vide
have
keep
drai
the l
hood
unth
thos
cont
more
Th
unde
is to
their
prop
all tl
corn-
versy
Whe
prote
inqui
serio
hope

THE REVENUE.

ABSTRACT of the Nett Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of April 1839, *and 5th of April* 1840,—*shewing the Increase and Decrease on each head thereof.*

	Quarters ended April 5.		Increase.	Decrease.	Years ended April 5.		Increase.	Decrease.
	1839.	1840.			1839.	1840.		
	£	£	£	£	£	£	£	£
Customs, ...	4,411,569	4,572,923	161,054	. .	19,504,628	20,001,267	496,639	. .
Excise, ...	1,841,511	1,929,996	88,485	. .	11,999,772	12,040,737	40,965	. .
Stamps, ...	1,640,258	1,658,188	17,935	. .	6,604,936	6,592,396	. .	12,590
Taxes, ...	176,440	179,058	2,618	. .	3,700,682	3,714,412	13,730	. .
Post-Office, . .	392,000	120,000	. .	272,000	1,548,000	1,247,000	. .	310,000
Miscellaneous,	75,545	77,180	1,635	. .	235,408	248,245	2,837	. .
	8,537,318	8,537,345	271,727	272,000	43,593,426	43,844,057	554,171	322,590
	Deduct Increase,		. .	271,727	Deduct Decrease,		322,590	
	Decrease on the Qr.		. .	273	Increase on Year,		231,581	

FIAR PRICES of the different COUNTIES of SCOTLAND, for Crop and Year 1839, *by the Imperial Measure.*

ABERDEENSHIRE.

	Imp. Qr.
Wheat, without fodder, .	60/
Barley, with fodder, . . .	36/6
——— without fod. .	31/
Bear, farm, with fodder, .	35/6
——— without fodder, .	30/
Oats, First, with fodder, .	28/6
——— without fodder,	22/
——— Second, with fodder,	27/6
——— without fod.	21/
Malt, no evidence, . . .	
Pease, ——— . . .	
Beans, ...	31/
Meal, 140 lb.	16/9

ARGYLE.

Bear, ...	33/4
Oats, without fodder, . .	22/6
Beans, ...	37/6
Oatmeal, 140 lb.	20/8½

AYR.

Wheat, ...	46/6
Barley, ...	34/10½
Bear, ...	32/9½
Oats, White, ...	20/1
Pease and Beans, ...	41/
Oatmeal, 140 lb.	20/4½

BANFF.

Wheat, without fodder, .	63/
Barley, with fodder, . .	38/3
——— without fodder, .	33/9
Bear, First, with fodder, .	34/4
——— without fodder,	29/10
——— Second, with fodder,	32/4
——— without fod.	27/10
Oats, Potato, with fodder,	29/9
——— without fod.	24/3
——— Common, with fod.	27/8
——— without do.	22/2
Pease and Beans, ...	36/
Rye, ...	
Oatmeal, 140 lb.	17/0

BERWICKSHIRE.

	Imp. Qr.
Wheat, ...	48/8½
Barley, Merse, ...	31/
——— Lammermuir, . .	26/4½
Bear, ...	
Oats, Merse, ...	24/4½
——— Lammermuir, . .	21/6½
Pease, ...	40/10½
Oatmeal, per 140 lb. . . .	20/11½

BUTE.

Wheat, ...	
Barley, ...	
Bear, ...	
Oats, ...	
Pease, ...	
Beans, ...	
Oatmeal, 140 lb.	

CAITHNESS.

Bear, ...	27/6
Oats, Early Angus, . . .	21/1
——— Potato, ...	23/9½
——— Hopeton, ...	22/10½
——— Dun, ...	19/
——— Black, ...	14/
Oatmeal, per 140 lb. . . .	17/9½

CLACKMANNAN.

Wheat, ...	42/
Barley, Kerse, ...	31/7
——— Dryfield, ...	30/11
——— Muirland, . . .	
Oats, Kerse, ...	21/3
——— Dryfield, ...	23/2
——— Black, ...	
Pease and Beans, ...	32/5
Malt, ...	57/6
Oatmeal, 140 lb.	20/4

DUMBARTONSHIRE.

Wheat, ...	45/6
Barley, ...	33/2
Bear, ...	28/5
Oats, ...	25/5
Pease and Beans, ...	41/3
Oatmeal, 140 lb.	21/3

DUMFRIES.

	Imp. Qr.
Wheat, ...	47/2
Barley, ...	30/10
Bear, ...	28/
Oats, White, ...	22/2
——— Potato, ...	23/4
Grey, Pease, ...	42/8
Rye, ...	34/10
Beans, ...	47/
Oatmeal, per 140 lb. . . .	20/7½

EDINBURGH.

Wheat, First, ...	56/
——— Second, ...	50/
Barley, First, ...	34/8
——— Second, ...	31/
——— Third, ...	28/
Oats, First, ...	24/8
——— Second, ...	20/
Pease and Beans, ...	38/[illegible]
Oatmeal, 112 lb.	15/6

ELGIN & MORAY.

Wheat, ...	65/
Barley, ...	37/4
Oats, ...	24/2
Pease and Beans, ...	41/1
Rye, ...	38/3
Oatmeal, 112 lb.	16/1

FIFESHIRE.

Wheat, White, ...	38/11½
——— Red, ...	36/11½
Barley, ...	28/7
Bear, ...	26/7
Oats, ...	22/9½
Pease and Beans, ...	36/2
Rye, ...	29/0½
Malt, ...	52/3
Oatmeal, 280 lb.	19/11½

FORFAR.

	Imp. Qr.
Wheat,	41/8
Barley,	27/
Bear,	24/3
Oats, Potato,	22/3
——— Common,	22/6
Pease and Beans,	33/6
Rye,	28/3
Oatmeal, 140 lb.	19/5

HADDINGTON.

Wheat, First,	68/3
——— Second,	61/11¾
——— Third,	56/10
Barley, First,	42/0¾
——— Second,	40/2
——— Third,	37/6½
Oats, First,	28/5¾
——— Second,	26/11½
——— Third,	25/2¼
Pease and Beans, First,	46/3¾
——— Second,	43/5¾
——— Third,	41/9

INVERNESS.

Wheat, without fodder,	64/
Barley, without fodder,	35/9
——— with fodder,	
Bear, without fodder,	
——— with fodder,	
Oats, Pot. & Hop. without fodder,	25/9
——— with fodder,	
——— Common, without fod.	24/1
——— with fod.	
Oatmeal, 112 lb.	16/5

KINCARDINE.

Wheat, without fodder,	44/11
——— with fodder,	53/5
Barley, without fodder,	27/1
——— with fodder,	33/1
Bear, without fodder,	27/3
——— with fodder,	33/3
Oats, White, without fod.	21/8
——— with fodder.	27/8
——— Potato, without fod.	21/4
——— with fodder,	27/4
Pease, without fodder,	36/6
——— with fodder,	47/6
Beans, without fodder,	35/
——— with fodder,	46/
Oatmeal, 140 lb.	18/8½

KINROSS.

Wheat,	25/4
Barley, First,	23/
——— Second,	20/
Bear,	
Oats, White, First,	21/
——— Second,	17/
——— Black,	
Pease and Beans,	
Oatmeal, per Boll,	19/4

KIRKCUDBRIGHT.

Wheat,	49/4
Barley,	30/
Bear,	
Oats, Pot. and Hop.	23/
——— Common.	20/8
Beans,	
Oatmeal, per 140 lb.	20/5

LANARK.

	Imp. Qr.
Wheat, First,	48/7
——— Second,	39/10
Barley, First,	33/4
——— Second,	27/0½
Bear, First,	31/10½
——— Second,	25/11
Oats, First,	25/1
——— Second,	20/11¼
——— Third,	
Pease,	
Beans,	40/
Malt,	
Oatmeal, First,	20/1½
——— Second,	19/8¾

ARCHBISHOPRIC OF GLASGOW.

Barley,	32/9
Oats,	23/4½
Malt, per Boll,	41/2
Meal, 140 lb.	21/4

LINLITHGOW.

Wheat,	47/5
Barley,	33/9
Oats,	25/
Pease,	41/2
Oatmeal, 140 lb.	20/2
Malt,	54/5

NAIRN.

Wheat,	65/6
Barley, without fodder,	36/
——— with fodder,	41/6
Oats, without fodder,	23/6
——— with fodder,	33/
Oatmeal, 112 lb.	15/4

ORKNEY.

Bear,	
Malt,	
Oatmeal,	

PEEBLES.

Wheat, First,	64/2½
——— Second,	56/2
——— Third,	55/6
Barley, First,	33/4
——— Second,	30/9¾
——— Third,	28/10
Oats, First,	23/9
——— Second,	22/7½
——— Third,	20/8¾
Pease, First,	42/
——— Second,	40/4¾
——— Third,	36/
Oatmeal, First, 112 lb.	15/10
——— Second,	15/5¼
——— Third,	14/9¾

PERTHSHIRE.

Wheat, First,	47/3
——— Second,	32/2
Barley, First,	28/9
——— Second,	23/5
Oats, First,	24/8
——— Second,	21/
Pease,	29/1
Oatmeal, 140 lb.	19/8

RENFREW.

	Imp. Qr.
Wheat, First,	44/1¾
——— Second,	42/10½
Barley, First,	35/9½
——— Second,	33/1½
Bear, First,	30/6
——— Second,	28/5
Oats, First,	23/10½
——— Second,	22/7¼
Beans,	
Oatmeal, 140 lb.	20/7¼

ROSS AND CROMARTY.

Wheat,	65/9½
Barley,	36/4½
Bear,	31/6
Oats, First,	26/
——— Second,	23/8¾
Pease,	38/4
Oatmeal, 140 lb.	19/0½

ROXBURGH.

Wheat,	54/8
Barley,	32/9¼
Oats,	24/10¾
Rye,	
Pease,	36/
Beans,	
Oatmeal, 140 lb.	19/10½

SELKIRK.

Wheat,	52/10
Barley,	29/4
Oats, Potato,	23/9
——— Common,	21/
Pease,	36/8
Oatmeal, 280 lb.	39/

STIRLING.

Wheat,	39/6
Barley, Kerse,	32/
——— Dryfield,	30/4
Oats, Kerse,	25/
——— Dryfield,	24/8
——— Muirland,	18/4
Pease and Beans,	35/2
Malt,	58/8
Oatmeal, 140 lb.	20/

SUTHERLAND.

Wheat,	62/
Barley,	38/6
Bear,	32/
Oats, Potato,	25/6
——— Common,	2 /6
Pease,	3
Rye,	
Oatmeal, 140 lb.	19/

WIGTON.

Wheat,	48/
Barley,	30/4
Bear,	28/8
Oats, Potato,	21/10
——— Common,	19/4
Malt,	68/4
Rye,	29/4
Beans,	38/2
Oatmeal, 280 lb.	40/3

We may inform our English readers, that Fiar Prices are the average prices of grain, as ascertained every year by the verdict of Juries in every county of Scotland. These Juries are summoned in spring, and ascertain, from the evidence produced to them, the average prices of the preceding crop. By these prices, rents payable in grain, and similar contracts, are generally determined; but the main object is to convert into money the stipends (for the most part fixed at ascertain quantity of grain) of the Scottish Clergy.

THE
QUARTERLY
JOURNAL OF AGRICULTURE.

ON RENDERING MANURES MORE PORTABLE, AND APPLICABLE BY THE DRILL.

By Cuthbert W. Johnson, Esq. Corresponding Member of the Maryland Horticultural Society.

The application of manures in a more concentrated form than that in which they naturally present themselves for the cultivator's service, was an effort reserved for modern agriculturists; an improvement chiefly induced by the increase of population, which almost compelled the farmer to force into cultivation the poor inland soils of England and the Continent: lands which could only be enriched by fertilizers brought from other districts, and from places where men congregated together in large masses. This necessity was, some years since, first felt and acted upon by many of the large continental cities, such as Paris, Berlin, Frankfort, and many of the other chief German towns. The contents of the cess-pools were, in consequence, collected; their fertilizing matters were mixed with drying, disinfecting substances, and, when thus reduced to powder, or into cakes, sold at a considerable profit. The enlightened constituted authorities of these places felt that they were, by so doing, conferring great and important benefits not only on their fellow-citizens, but upon the *distant* cultivator. They did not confine their attention to the farmers in their own direct vicinity; because they well knew that those, in common with the immediate agricultural neighbours of all large cities, have a ready access to an abundance of organic manures, since the cultivators so favourably situated carry their produce with facility into such populous places, and return with their carriages loaded with manure. And yet, when the German and French authorities thus husbanded, thus rendered more portable, the manure of their large towns, they made no discovery; they merely practised what the Chinese had preceded them in from time immemorial, and what, in Flanders, is an old and long cherished custom. The only improvement which the citizens of Paris and Frankfort have made is, that they form with their nightsoil an enriching powder; while those of China and of Belgium still make theirs into cakes, with a portion of either clay or marl; so that the powder of Paris can be either applied with the drill or dibble, but the Chinese and Flemings are obliged to dissolve theirs in water, before it can be used as a liquid manure with advantage.

In England, however, notwithstanding the example of our neighbours, little or nothing has yet been done to render the commonest manures, such as, for instance, nightsoil, more portable. The nightmen and scavengers are still compelled to hurry away their collections only at stated hours and in the dead of the night, are fined for neglect, and harassed in all possible ways, rather than that this, the most powerful of all the animal fertilizers, should be preserved for the use of the farmer in any way that might endanger the olfactory nerves of the citizens. This manure, therefore, has been hitherto little known or employed in this country; its powers have been misrepresented; all sorts of prejudices have been created against it. I propose in this paper briefly to shew, *first*, The composition and fertilizing powers of nightsoil; and, *secondly*, To examine the modes which have been recently adopted to render it inodorous and more easily portable, so as to bring it within the reach of even the farmer who has to contend with the poorest, the most upland soils of Britain, far away from its great towns.

And, although I confine my attention in this essay chiefly to one fertilizer, yet there are other manures, now well known to, and extensively employed by, the cultivator, whose powerful action, when judiciously used in very small proportions, well illustrates the truth of what I have so often ventured to urge upon the farmer's attention, viz. that a much smaller quantity of manure, composed of any description of organic decomposing matters, is sufficient, when applied in a skilful manner, to produce the most luxuriant effects, than is commonly believed. The very great importance of applying fertilizers in immediate juxtaposition with the young plant, even in very small proportions, as by the drill, is only now beginning to be considered with even patient attention; and yet there are many circumstances, with which the farmer is well acquainted, which ought to convince the most inattentive that such is the fact. The small quantity of oil-cake drilled with the seed; the few bushels of bones successfully applied in the same way per acre; the woollen rags of the Berkshire farmers (half a ton per acre only); the two hundredweight of gypsum applied to sainfoin and clover; the one hundredweight of saltpetre, or of nitrate of soda, used on the same extent of land,—all indicate the truth of the case, that it is not absolutely necessary to apply fertilizers of any kind in such great masses as are commonly deemed essential by the cultivator. It was not long since that I was told by an excellent farmer of Middlesex, Mr George Sherbourn, that he had succeeded in producing the finest crops of turnips by merely mixing with about eighty bushels of coal-ashes per acre, three gallons of train-oil, and drilling these oiled ashes with the seed. It is a folly, therefore, to contend that the careless way in which organic manures of all kinds are usually employed is the most economical, and susceptible of no improvement. Such complacent feelings have ever been the bane of agricultural improvement; for it is then certain to follow as a natural result, that the system which the cultivator deems perfect, will, in his hands, remain as he found it. Having no hope for better things, better modes will by him never be discovered.*

---

* Some recent experiments on a very bold scale, in the forest of Darnaway in Scotland, have shewn, that the application of a quantity of lime under each seedling tree, even so small in amount as four bushels per acre, has been productive of the most excellent effects, imparting to the plantation a degree of luxuriance hardly credible. The same advantage, therefore,

There are several advantages derivable from placing the seed in direct contact with the manure, to which the farmer very rarely attends. For instance, the germinating seed in the immediate neighbourhood of the fertilizer, is hence copiously nourished at the very period of its growth, when it most needs assistance to enable it to develop its fibres, and to extend its roots. The young plant, thus situated, is not exhausted in its extension; it avoids the usual fate of those crops which tenant poor soils, whose roots are obliged to penetrate some distance in search of the requisite degree of nourishment. On the contrary, the strength of the plant is thrown into the stem and leaves, and the crop flourishes luxuriantly; for the leaves and roots of the thus irrigated and healthy plant are enabled to absorb the gases and aqueous vapour of the atmosphere, by which it is nourished in the most complete and copious manner. The very mechanical effect, too, of placing the decomposing organic manure in direct contact with the roots of vegetation, facilitating the free access to them of the atmospheric gases and vapour, would be alone a sufficient reason for the adoption of the manure drill system, even if we say nothing of the other certain advantages of the plan, such as, in the case of decomposing fertilizers, the presentation of the gases of putrefaction to the roots of the plant at the moment of their extrication, and the economical and *forcing* effects of this mode of distributing the manure. The farmer, in fact, tells you that the plan is probably a good one, but, then, his explanation of the derived benefit is very erroneous. He informs us, that thus to push forward the growth of the young crop is very likely to be good husbandry, especially on light soils, since, by this means, where the ground is well covered with the crop, "*the moisture is kept in, and the sun is kept out.*" If the cultivator would but remember, that the quantity of moisture transpired by a given surface of a growing crop is considerably greater than that emitted by the most naked fallow, he would no longer be content with such

---

which is derivable from the application of a very small quantity of organic manure, *in immediate contact* with the growing plant, is evidently also derivable from a much smaller quantity of earthy manures, than the farmer commonly supposes.

an *explanation* as this. He would at once acknowledge, that the advantages of an early and vigorous growth of spring corn must be explained in quite a different manner from that with which he is sometimes much too readily contented.*

If I were asked to produce any evidence of the extreme difficulty with which agricultural improvements, even of the most undoubted value, are introduced, I should at once instance the manure drill, whose progress has indeed been slow —for it has shared the fate of very many other scientific efforts—been zealously opposed by the ignorant—neglected by the indolent—and ridiculed by the bigoted farmer, as an innovation upon the good old system of the days of the patriarchs of agriculture, when the earth brought forth its fruits in abundance, and the very seeds were not sown by man. But even here this solitary argument of the clinger to old customs fails; for the Chinese (the most expert of farmers),† and the cultivators of Japan and of Arabia have drilled and dibbled in their seed from time immemorial. The natives of the Carnatic do the same; and after they have thus deposited their seed, the Hindoos use a kind of subsoil-plough, which passes under, and loosens, to the depth of about eight inches, the soil under about three drills' breadth at a time.‡ And so prejudiced are the natives of those empires, too, in favour of the customs of their ancestors—so rarely do they introduce new customs, that it has been hence very reasonably concluded, that the drill system, so far from being entitled to the appellation of the "new husbandry," ought rather to be classed with those branches of the sciences which degenerated, or were lost in the dark ages.*

---

* Dr Hales ascertained that a cabbage transmits into the atmosphere by insensible vapour, about half its weight of vapour daily; and that a sunflower, three feet in height, transpired, in the same period, nearly two pounds weight. Dr Woodward found that a sprig of mint, weighing 27 grains, in seventy-seven days emitted 2543 grains of water; a sprig of spearmint, weighing twenty-seven grains, emitted, in the same time, 2558 grains; a sprig of common nightshade, weighing forty-nine grains, evolved 3708 grains, and a lathyrus of ninety-eight grains, emitted 2501.—*Phil. Trans.* 1699, p. 193.

† Sir George Staunton, in his account of Lord Macartney's Embassy to China, says, vol. ii. p. 375,—"Near Sanchoo, wheat was perceived growing for the first time in China. It was, though on a dry sandy soil, where no rain had fallen for the three preceding months, looking remarkably well. It was very neatly sown in drills, or dibbled, according to the method used of late in some parts of England. A gentleman of the embassy calculated that the saving of the seed alone in China by this drill husbandry, which would be lost by that of broadcast, would be sufficient to maintain all the European subjects of Great Britain."

‡ In a communication to the Board of Agriculture, dated at Junacondah, December 31. 1795, Captain Halcott says—" The drill-plough, I find, is in

It is useless to search in the works of Jethro Tull for any recommendation of the drill as a means of applying manure; for all Tull's arguments and experiments are directed to proving that the application of manure of any kind is utterly needless. And yet he had the discernment, when thus suffering his enthusiasm to carry him much too far, to make the observation, that "the almost only use of all manure is the same as of tillage; viz. the pulveration it makes by fermentation, as tillage doth by attrition or contusion: and with these differences, that dung, which is the most common manure, is apt to increase weeds, as tillage (of which hoeing is chief) destroys them."† The advantage, thus glanced at by Tull, of the manure keeping the ground light and porous, is much greater than the cultivator commonly suspects, and this benefit is mainly owing to the free access which is thus secured of the watery vapour and gases of the atmosphere to the roots of the plants. Now, for the vapour of the atmosphere, all well pulverized fertile earth has a strong attraction—the richer and the better divided the soil, the more copiously does it absorb vapour; but the power of the richest cultivated soils in this respect is very much inferior to that of even the most ordinary manure. In my own experiments, I have never found, in a given space, say three hours, that 1000 parts of the richest soil previously dried, absorbed more than from 14 to

---

general use here, and has been so, time immemorial, in the culture of all grain (except horse-grain), and also of tobacco, cotton, rice, and the castor-oil plant."—Com. Board of Ag. vol. i. p. 355.

* The first drill introduced into Europe seems to have been the invention of a German, who made it known to the Spanish court in 1647.—(*Hartes' Essays on Husbandry.*) The Roman farmers endeavoured to attain the advantages of row culture by ploughing in the seeds.

† New Husbandry, p. 166. First Edition. 1731.

20 parts of moisture; but in the same time, under similar circumstances, 1000 parts of horse dung absorbed 145 parts—cow dung, 130—pig dung, 120—sheep dung, 81—pigeons' dung, 50.* So that it is evident, that, for the mere purpose of withstanding long continued dry weather, those plants whose roots have immediate access to organic manures, as by the manure drill system, will be much better enabled to absorb the necessary supplies of atmospheric moisture, than those merely vegetating in the unmanured soil.

The merit of the introduction of the drill to *general notice* in England, is, however, to be ascribed, in a very great measure, to Jethro Tull. But he was certainly not the originator of the idea of thus applying the seed; for, nearly a century before his time, John Worlidge ineffectually, in 1669, laboured hard to draw the English farmers' attention not only to the drill, but to *the manure-drill* also. Yet Jethro Tull certainly thought himself the inventor; for he tells us so very clearly, in the preface to the first edition of his Horse-Hoe Husbandry, published in 1731, and even whence he derived the hint for his drill, he says—" When I was young, my diversion was music; I had also the curiosity to acquaint myself thoroughly with the fabric of every part of my organ; but as little thinking that I should ever take from thence the first rudiments of a drill, as that I should ever have occasion for such a machine; or practice agriculture, for 'twas accident, not choice, that made me a farmer." And little can be now added to what, 175 years since, honest John Wolridge urged in its favour, when he said, after describing the seed-drill—" By the use of this instrument, also, you may cover your grain or pulse with any rich compost you shall prepare for that purpose, either with pigeons' dung, dry or granulated, or any other saline or lixivial substance, made dispersable, which may drop after the corn, and prove an excellent improvement; for we find, experimentally, that pigeons' dung, sown by the hand on wheat or barley, mightily advantageth it in the common way of husbandry; much more, then, might we expect this way, where the dung, or such like substance, is all in the same furrow with the corn; whereas, in the other vulgar way, a great part thereof comes not near it. It may either be done by having another hopper on the same frame behind that for the corn, wherein the compost may be put and made to drop successively after the corn; or it may be sown by another instrument to follow the former, which is the better way, and may both disperse the soil, and cover both manure and seed."

---

* My work " on Fertilizers," p. 41.

Worlidge was well supported by Evelyn, who, in a communication to the Royal Society, dated in February 1669,* urged the advantages of a drill-plough, which, first invented in Germany, had thence been introduced at Madrid under the auspices of the Spanish monarch, and had been forwarded from Spain by the Earl of Sandwich, as the invention of a Don Leucatilla. It is there decribed as "the Spanish sembrador, or new engine for ploughing, and equal sowing all sorts of grain, and harrowing at once." Leucatilla saw very clearly the errors of the broadcast system, he observed—"*Even at this day* (1669) all sorts of seeds are sown by handfuls, heedlessly and by chance, whence we see corn sowed in some places too thick, in others too thin."

It was between the years 1720 and 1740 that Jethro Tull laboured thus hard, and with a success little equal to his merits, to introduce the drill system: the honour, however, was reserved for the present Lord Leicester, in the early part of the present century, of inducing its general employment, for which the soils of the greatest portion of Norfolk are so very well adapted. It then naturally followed, that various manures were found easily applicable at the same time with the seed. Powdered oil-cake was one of the first substances that was used as a manure, and the discovery of the value of crushed bones as a fertilizer for turnips, opened another wide field for the useful application of this invaluable machine. The manure-drill, in fact, thence received an impetus which it will probably never lose, for with its use is now almost inseparably connected the cultivation of some of the most extensive districts of the poor light lands in the north of England; such as on the Wolds of Lincolnshire, and the Sands of Nottinghamshire. Its first use for bones in the former county was thus described to me in 1836 by Mr Thomas Brailsford of Barkwith:—"The use of bones crushed small enough to pass the drill began in Lincolnshire about twenty or twenty-five years since, and may now be considered as *general* over the greatest part of the county, and *uni-*

---

* Trans. Roy. Soc. vol. v. p. 1056.

versal over those great natural divisions the Heath and the Cliff (the corn-brash and the upper oolite), and the Wolds (the chalk and the green sand). The effect produced has been wonderful: it has converted large tracts of thin-skinned and weak lands into the most fertile districts. The quantity now drilled varies from ten to twenty strikes of half-inch bones, *with the dust in them,* per acre, and it is used almost exclusively for turnips, experience having proved that it is most profitably adapted to the cultivation of that crop. It may be right to add, that it is considered that the feeding quality of turnips raised by bones, exceeds that of those produced by dung."

The most recent improvement in the manure-drill is that of Mr Grounsel of Louth, for which the English Agricultural Society awarded him, in 1839, their Silver Medal. It is an attempt, and an excellent one too, to imitate the dibbling system, so as not only to save seed, but the manure also. And although, in all researches of this nature, it is especially necessary to proceed with great care, and to regard single expements with great caution, yet what has been yet experienced of its powers, is certainly of a nature to induce farther and more extended trials; since it is evident that this drill can apply,-and evenly too, as small a quantity of crushed bones or ashes, &c. as six bushels per acre. In reply to some inquiries of mine, the inventor says,—" My drill will deposit from 6 to 100 bushels per acre of any kind of compost that may be prepared for drilling, from 10 inches to any greater distance apart in the rows, with turnips or corn, and either in a wet or dry condition; but I recommend, from experience, ashes to be applied, in a wet state, especially in a dry turnip seed season, for then the seeds vegetate much sooner."* †

---

* Letter to the Author, March 1840.

† We saw this drill at the Oxford Show, and it then could not deposit *small* quantities of ashes at *short* distances with precision,—the quantity, when deposited with any thing like precision, being considerable, and the distance betwixt the heaps 16 inches, much too great a distance for turnips. The apparatus necessary for depositing the manure in heaps, rendered the whole machine very complicated, and of course expensive. This mode of depositing manure has been tried in Scotland and abandoned, not only on account of the *uncertainty* of the machine depositing the manure at the requisite distance of 9 inches for white and yellow turnips, and of 12 inches for Swedes, but also in case *all* the plants happened to be taken away above a heap of manure in the thinning process, a large blank was left in the crop, and the seeds having been sown without interruption, the plants in the intermediate

Admitting the truth of these experiments, that one-half of the quantity of the organic manures usually spread on the land is sufficient, when applied by the drill, in immediate contact with the seed, what a field is thus opened for the manuring of much larger breadths of land than has hitherto been deemed possible. The complaints of the deficiency of manures, which are now so prevalent with farmers, need then no longer be heard. Their crops will be properly nourished, and the manure applied with them will be not only bestowed in the most scientific manner, but it will lead to other improvements—it will enable the farmer to mix his manures, according to the nature of his soil and his crop, with much more facility than at present—he will then study, not merely the economy to be regarded in its distribution, but also its quality, or chemical composition, and to what soils the manure is best adapted.

There is one class of fertilizers, however, whose application by the drill requires great caution, I allude to the saline manures, for they are often much too powerful in their operation to be safely applicable in their pure state or in large proportions. Common salt has, in this way, carried great destruction by being drilled in with the seed, and I have witnessed equally disastrous effects from applying the lime of the gas-works (hydrosulphuret of lime) in the same way. Yet when the seed wheat is wetted with a nearly saturated solution of salt, and then rolled in lime, or the salt and lime are not used until they have been mixed together for three months, and then sown on the land broadcast,—or when the gas-lime is previously mixed with four or five times its bulk of sifted mould, or ashes, then I have seen the most excellent effects produced. By its being drilled with the turnip-seed, the same remarks apply to the chloride of lime of the calico-bleachers. Other salts, whose action is less energetic, or which are applied in very small proportions, are perhaps best applied by the drill; for instance saltpetre, which is rarely applied in lar-

---

distance between the heaps were not worth keeping. There seems no good reason for depositing the manure in small *heaps* for turnips; and the uncertainty of its deposition at the requisite distances, with the complication of the machinery, seem to counterbalance any advantage to be derived from e plan on the score of economy.—Editor.

ger proportion than 1¼ cwt. per acre, may very likely be still more reduced in quantity, especially if mixed with other substances, such as three or four times its bulk of mould. Mr Beadel of Witham, in Essex, a very excellent farmer, has found, that where saltpetre was applied to his turnips broadcast as a top-dressing, it did not succeed, but it did so very decidedly when it was drilled with the seed.

In those situations where nightsoil, or sprats, or bones, cannot be obtained at a sufficiently reasonable rate, very great effects may be produced by the careful collection of the excrements of domestic animals, and mixing them with merely a sufficient quantity of dry ashes, mould, saw-dust, or, what is best of all, recently prepared finely powdered charcoal, to render them sufficiently friable to pass the drill,—this is very easily accomplished, by making the preparation under cover some months before it is used, and, if necessary, by causing it to be spread in the sun. By the adoption of these means, a very recent mixture will be found available by the farmer,—the excrements of the horse, cow, and especially the sheep (still more so if fed with oil-cake), will be found excellent for this purpose. Mr Turner of Tring, in Hertfordshire, for many years successfully adopted the plan of collecting sheep-dung for this purpose,—this he did at an expense of 2½d. per bushel, paid to the collectors. It was gathered together in the winter, and applied in various proportions, mixed with crushed bones. And he arrived at the conclusion, that 51 bushels of sheep-dung were equal in effect upon turnips to 25 bushels per acre of bones. This was invariably drilled in with the turnip-seed.* And in almost equally small proportions the Peruvian farmers, according to Humboldt, employ the guano or excrements of sea-fowl (which abound in phosphate of lime), or earthy salt of bones, which is brought in sailing vessels, from the rocky islands of the Pacific Ocean, expressly for the use of the cultivators of that republic.

And that bones might be very profitably mixed with other fertilizers, so as to materially reduce the expense of the manure, is indicated by more than one successful experiment.

---

* See my work "on Fertilizers," p. 139.

To give another instance, which has recently been communicated to me, in the trials made by Daniel Dixon, Esq. of West Clandon in Surrey. " On a poor chalk soil," observed an excellent and scientific friend of mine, "he has used a compost for a manure drill for turnips with great advantage. He puts 8 bushels of ground bones with 24 bushels of any ashes he can get together, in a dry place, and from time to time (as often as possible) he empties the liquid sewerage of the house upon it. In two or three months, it is fit for use, working well out of the drill. The above is the quantity for an acre. The effect of drilling this mixture with the seed was very remarkable, and as bone manure was drilled by the side of it, the contrast was at once visible; the difference was more than double. In fact, the bones by themselves seemed comparatively useless. The soil on which the mixture has been applied is poor, chalky, and flinty, abutting upon the sheep-walks and Guildford Race-course. Whenever the mixture is too wet for the drill, it is spread to dry for a day or two."* †

The application of rape-cake powder by the drill has never been so common as it ought to be, for it is not only a very powerful, but a very easily manageable fertilizer; it has moreover the advantage of being moderate in price, and easily obtainable at all seasons of the year. There is no doubt of the advantage of feeding stock with this food, the manure they produce when thus fed being exceedingly rich. Many farmers, however, owing to the want of cattle, or an unwillingness to lay out the requisite money, in a long course of stall-feeding, are deterred from using oil-cake to the extent they would otherwise do. The use of the oil-cake powder conveys to the land all the enriching ingredients of this fertilizer at once, and to the exact extent the farmer requires, there is neither the waste, the risk, or the trouble of stall-feeding to be dreaded. The oil remaining in the cake certainly constitutes its most enriching portion; the oil abounding in sprats is an instance familiar to the farmer, and when this oil is imperfectly crushed out, the cake produced (as is well known to the

---

* Letters of Henry Dixon, Esq., to the Author, November 1839, and March 1840.

† A friend of ours, a farmer in Northumberlend, the late Mr George Brown, Hetton Steads, mixed any quantity of coal-ashes, kept dry, and finely riddled, with a quarter of bone-dust per acre, and raised as good a crop of turnips (of course, drilled), of all kinds, on a clayey soil, resting on a retentive bottom (but drained), as he could with two quarters of bone-dust.—EDITOR.

Swedish cultivator in the case of herring-cake) is found to be exceedingly enriching. A very small quantity of oil left by the crushers in the cake will produce very great results; even three gallons of train-oil has, as I have mentioned in another place, been found amply sufficient per acre, when mixed with earth or ashes, to produce a capital crop of turnips. It has been found (and this is another illustration of the value of the manure-drill) that when rape-cake is *drilled* with the turnip-seed, 3½ cwt. per acre is sufficient, but if it is applied *broadcast*, then double the quantity is required. My friend Mr Davis of Spring Park, in Surrey, is well aware of the powers of oil-cake as a manure; he has found it even an advantageous plan to drill common coal, wood, or turf ashes at the rate of 40 bushels per acre with his turnip-seed, and this he has successfully practised for some years, so much is he in favour of bringing the seed and the manure into immediate contact.

In proceeding to examine, as an instance of one of the least likely substances successfully applied by the drill, the properties of nightsoil, and the modes which have been adopted to reduce its weight, without impairing its effect, many reflections will suggest themselves to the farmer. He will notice, that such a process, by producing it in the state of powder, renders it capable of being readily *drilled* with the seed; and that the same remarks apply in a great measure to the excrements of the farm-yard,—to whale blubber, and to fish. The Essex farmers find, that when sprats are mixed with earth, finely divided, the mass, when these very oily fish are quite dissolved in the mould, forms a very powerful fertilizer, which is excellent as a drill-manure for turnips. They tell you, that the sprats lose none of their enriching powers even when thus kept mixed with earth for some months.*

Even earthy manures may be advantageously reduced in weight by exposure to the air, or by the application of artificial heat. Chalk, I have found by experiment, loses from 15 to 25 per cent. of its weight by being thus deprived of its water; and a cubic foot of calcareous sand, when thoroughly wet, contains, according to M. Schubler, more than 31 lb. of water; the same measure of sandy clay 38 lb.; loamy clay 41 lb.; stiff clay or brick-earth 45 lb.; pure grey clay 48 lb.; garden mould 48 lb.; and fine slaty marl 35 lb.* By exposing the earths to an intense heat, their weight is still further reduced by the loss of their carbonic acid gas or fixed air: hence 100 parts of chalk, for instance, when thus treated, lose very commonly 24 parts of water and 34 parts of carbonic acid; so that 42 lb. of lime, when well burnt, contain as much real earth as 180 parts of chalk. All these facts are such as the cultivator should be thoroughly acquainted with; for, in many cases, the earth which the farmer removes might be previously very advantageously dried, by exposure in spits to the action of the atmosphere. Even the difference of labour to the men and horses, between carting them after continued dry weather and in wet periods, is much more material than the cultivator commonly believes.

---

* Of crushed mussel-shells 32 bushels per acre have been tried in Forfarshire against 16 bushels of bone-dust in raising turnips, and although the crop was good, it was not equal to that from the bones.—EDITOR.

My attention, however, will, in this place, be principally confined to fertilizers of an organic nature, and more especially to nightsoil. Nightsoil has not, in any form, been employed by the farmers of England to the same extent as on the Continent, although it is certainly by far the most powerful of the organic manures, and the most easily rendered applicable by the drill of any of the class. To this neglect many causes have contributed. Its disagreeable odour, certain vexatious fiscal regulations with regard to its removal, to which I have before alluded, and the erroneous modes of applying it, either in excessive quantities, or mixed with other composts in such proportions that its powers could not be distinguished in the mass; its semifluid nature requiring for its removal carriages of a peculiar construction; the extent and completeness of the sewerage of our large cities, and several other minor obstacles, have rendered its use not nearly so extensive as, even in a national point of view, is desirable. And yet, twenty-five years since, Davy described it as "a very powerful manure, and very liable to decompose; a part of it is very soluble in water; and in whatever state it is used, whether recent or fermented, it supplies abundance of food for plants." * The disagreeable smell, he told the farmers, might be easily destroyed, by mixing it with quicklime; and he suggested that it might be easily dried, and pulverised, by mere exposure to the sun and air, and thus be rendered capable of being used like rape-cake, and delivered into the furrow with the seed. Nightsoil, according to the analysis of M. Berzelius, is a mixture of the solid matters of urine and fæces, in various proportions. An examination of the results of these laborious and disagreeable investigations will be useful to the farmer in several ways: it will convince him of the powerfully enriching substances of which it is composed; and he will see, by the quantity of water which they contain, that when this is driven off by a gentle heat, as in some of the artificial manure-powders, that such, when carefully prepared, must be still more powerful in their effects than the nightsoil of which they are composed. The illustrious Swedish chemist found fæces to be composed of—

---

* Translation by James Hudson, Esq. *Journ. of Eng. Ag. Soc.* vol. i. p. 184.

Water,	73.3	parts
Vegetable and animal remains,	7.0	...
Bile,	0.9	...
Albumen,	0.9	...
Peculiar and extractive matter,	2.7	...
Salts,	1.2	...
Insoluble residue, &c.	14.7	...
		...
	100.	...

The salts were, carbonate of soda, muriate of soda, sulphate of soda, ammonia, phosphate of magnesia, and phosphate of lime. †

1000 parts of urine were found by Berzelius to contain,—

Water,	938.00	parts
Urea,	30.10	...
Sulphate of potash,	3.71	...
Sulphate of soda,	3.16	...
Phosphate of soda,	2.94	...
Muriate of soda (common salt),	4.45	...
Phosphate of ammonia,	1.65	...
Muriate of ammonia,	1.50	...

---

* Lectures, p. 299.

† Gehlen's Journal, vol. vi. p. 536.

Acetate of ammonia, Animal matters,	17.14 parts.
Earthy phosphates and Fluate of lime,	1.00 ...
Silica and mucus,	0.35 ...
	1000. ... *

The very chemical composition, too, of these substances, will convince the farmer that they must produce the most fertilizing effects. The mass of easily decomposable and soluble animal matters, and salts of ammonia with which they abound—the phosphate of lime—the carbonate of soda—are all by themselves excellent fertilizers, and must afford a copious supply of food to the cultivator's crops.

On the Continent, the use of various manure-powders made from nightsoil, is equally extensive and successful. An elaborate report upon these was made a short time since to the Directors of the Thames Improvement Company by Dr Granville, who had been commissioned to make the requisite inquiries and surveys; and from this we learn, that the consumption of nightsoil in Flanders is very large, but that the farmers, instead of employing it in the dry or powdered state, rather prefer to mix it with water, and thus form a rich liquid manure. Of late years, the French farmers have adopted the same views with regard to nightsoil, but the practice of their farmers in this respect is somewhat different. They prefer, for the sake of easy and convenient transport, to dry the stercoral substances to a powder, which bears the name of *poudrette*, which is sent into the country from the neighbourhood of the capital, and is sold at a high price. The success of the establishment for the manufacture of *poudrette*, first formed near Paris about forty years since by a person named Bridet, has been such, that, in almost every part of the kingdom, similar manufactories have been erected, and nothing now is wasted. The Parisians have at present several such large works. M. Bridet obtained a patent for his process of manufacturing the *poudre vegetative*. He proved by experiments that the poudrette is many times more valuable than the best sort of ordinary manure. It was found, after repeated trials, that 240 lb. of the poudrette would manure an acre of ground with greater effect than eight cart-loads of the best stable-manure.[*]

---

* Annals of Philosophy, vol. xi. p. 423.

Under the name of "Alkalino-vegetative Powder," another preparation of nightsoil was ushered into notice in France, and generally adopted, under the auspices of an agricultural lady, Madame Vibert Duboul, to whom, in consequence, the Royal Society of Agriculture, in 1814, awarded their gold medal. This lady obtained a patent of fifteen years for her process, which consisted in promoting fermentation in the most liquid portion of the excrementitious substances, and treating them with slaked lime afterwards, so as to form a powder, which has been found to be very superior to the first-named "poudrette" upon cold, light, or moist soils. Its action is very powerful, and it extends its influence over the soil for several years, without requiring during that period a repetition of the manuring process. This is not the case with the "poudrette" of Bridet, the influence of which over any soil is only annual.

In 1818, another company was formed near Paris (Messrs Donat & Co.) for the manufacture of another kind of manure from nightsoil. The name of "Urate" (from the principal ingredient used) was given to it, and the Royal Society of Agriculture deemed it an object of sufficient importance to deserve being submitted to the examination of a joint committee of chemists and agriculturists, in which were included the names of Vauquelin, Dubois, &c. The report made by these distinguished men is full of interest to the agriculturist. Urine is the active ingredient, and plaster of Paris, so common in the neighbourhood of that capital, the other constituent. This mixture is reported by the joint committee to be so powerful in its effects upon the dullest soil, that they recommend that it should only be employed by skilful and discriminating farmers. For this discovery the inventor received the gold medal from the government. In 1820, another patent was granted to a M. Loques by the French government, for a manure called " Stercorat," consisting of a mixture of both the solid and liquid parts of the excrementitious matters, and some earthy substance. It is said to be particularly efficacious, and sells at a very high price.

---

[*] Brevet, tome i. p. 371.

[†] "M. Hermstadt gave, in the monthly Journal of the Economical Society of Potsdam for August 1838, as the result of his experiments instituted with the view of ascertaining the comparative fertilizing powers of farm-yard manure and poudrette, that poudrette is a complete substitute for common dung, whether with respect to price or quality."—*Quarterly Journal of Agriculture*, No. xlvi p. 285..

M. Parmentier, a celebrated French agricultural writer, some years since expressed his surprise at the tardiness of his countrymen in adopting the practice of their Flemish neighbours, and in continuing so long to pay money for getting rid of that which other nations first, and the French themselves afterwards, found to be so productive of wealth. He quotes the case of an individual who in former times had amassed great wealth by the sale of a manuring powder, which he manufactured from the very soil he was annually paid by government to remove out of the extensive military barracks of Lisle.

There existed at one time much public prejudice against this mode of rendering the land more productive, on the wild supposition that the obnoxious principles of such a manure would form part of the plants raised by means of it; but the most accurate experiments have proved, that not the least vestige of such animal substances is to be detected either in the ascending sap, or in the more solid parts of the plants so cultivated. A great extent of the rich plains of Normandy are fertilized every year by the manure in powder, manufactured at present out of the cess-pools of Paris.

The poudrette sells for eight francs the *sestier* on the premises, and the whole is fetched away at that price as soon as ready, and principally distributed within twelve leagues of Paris. Now, as there are 7½ sestiers in a ton, it is evident that the value of the latter is 60 francs, or L.2, 10s.; and yet the comparative agricultural value of this compost is not so great as that of the " Flemish Manure." Messrs Payen and Company, the patentees of the " Engrais animalizé," or disinfected nightsoil, sell their " poudrette" at two francs and a half per ton under the market price of that of Montfauçon, and they have rarely any left on the premises.

The engrais animalizé, or disinfected nightsoil, has recently been introduced into this country by M. Poittevin, and a manufactory of it established in Whitechapel, near London. It is there produced by mixing the nightsoil of the metropolis with a considerable quantity of recently prepared charcoal powder, and drying the mass in a very gentle heat. As thus prepared, its appearance somewhat resembles that of the friable rich vegetable mould of an old hot-bed—it is of a very dark colour—and is totally devoid of smell. Its introduction into this country has been too recent for any very extensive trials to have been yet made with it; my own are only now carrying on; these, however, promise well. In some comparative experiments made last year with bones, they were found to answer very completely. These results have been confirmed by several communications with which I have been recently favoured, stating that, to use the words of Col. Challoner, "this manure, in its effects upon the turnip crop, was fully equal to bones." And Mr Beach of Oakley Hall, near Basingstoke, who had applied it by the drill with the seed, at the rate of fourteen bushels per stone to a portion of a field of turnips; and, on another portion, drilled three sacks per acre of crushed bones, mixed with turf ashes; and, on a third portion, with ordinary stable manure, says, in February last, "It is impossible to distinguish any difference between the three, some persons fancying one part, and some another, to be superior. In their early growth, the nightsoil had a decided advantage. The seed came up as thick as rows of mustard-seed in a hot-bed, and the turnips were hoed out within a month." Mr Beach adds a suggestion, which I think highly worthy of the attention of the turnip cultivators, "I am so well satisfied with it for turnips, that I shall use a large quantity of the nightsoil powder this season. I shall also mix ten or twelve bushels with a quarter of crushed bones, which, I am inclined to think, will answer well."

A preparation of nightsoil has been lately imported into Scotland and the north of England from Copenhagen, under the name of Owen's Animalized Carbon, which has answered, when applied by the manure drill, very well for turnips. Mr James Waldie, in his recent prize communication to the Ayrshire Agricultural Society, describes it as an useful auxiliary as a manure, and as likely, in a great measure, to supersede the use of bones, now that the latter have risen to the enormous rate of at least 3s. per bushel. He says, " One ton of carbon, the cost of which is L.3, is sufficient for an acre of land; and from experiments which I have made this year, conjoined with what I have observed of two successive crops on a farm in this neighbourhood, where comparative trials were made with different manures, on a very extensive scale, it may be inferred, that one ton of carbon is equal to twenty-five bushels of crushed bones." These experiments are supported by the observations of Mr M. Milburn of Thorpefield, near Thirsk, when describing, in his report to the Yorkshire Agricultural Society, the various fertilizers advantageously employed on light lands in the cultivation of turnips; for, he observes, " Animalized carbon has been used advantageously; sixteen bushels per acre, when drilled, is the quantity generally employed. Pigeons' dung is most valuable; rape-dust has been used successfully; malt culms are useful as a top-dressing."* There is a chemical " seed-manure," prepared by Messrs Hodgson and Simpson, near Wakefield, which is applied, mixed with water, as a liquid manure, or steep to the seed-corn, and seems, from a communication with which they favoured me in March 1840, to be a kind of secret preparation, composed principally of saccharine matter ammonia, common salt, and nitre. This seed-manure is applied according to the following directions, instructions which might be advantageously followed in the use of other fertilizers: " Dissolve 28 lb. of this manure in a pail, by adding water in small quantities, stirring it at the same time, until the mixture is of the consistence of thick cream; it is then to be poured over the quantity of seed intended to be sown on an acre of land, and the whole repeatedly turned over, so that it appears one uniform mixture; it is then to be spread out thin on the floor to dry for ten or twelve hours, and mixed with a sufficient quantity of soot, or any kind of dry ashes, to render it sufficiently friable to be sown by the hand or by the drill." The quantity thus directed to be applied per acre, is certainly very small, and yet, according to the testimonial which I have seen, the effect it produces is considerable. Mr Milburn of Thorpefield, in one of these, tells us: "A new principle in the application of manure has been developed in the use of the chemical seed manure, which, by applying a chemical composition to the seed itself, not only secures immediate effect in the precise situation required, but highly economizes the quantity necessary. I have great pleasure in detailing a very successful experiment with it on a barley crop. The field had grown a corn-crop the preceding year—part of the field was dressed with a coating of fermented farm-yard dung—the remaining part with the chemical seed-manure, at the rate of 28 lb. per acre. The result was, that the barley sown with the chemical manure, exhibited a decided superiority over the rest of the field, in colour, healthiness, and general appearance, and maintained that superiority to the time of cutting, inasmuch that it lodged considerably more than the rest of the field."

---

* Brit. Farm. Mag. vol. iv. N. S. p. 85.

Various modes besides those to which I have alluded, have, at different times, been suggested, by which nightsoil might be rendered more concentrated, and more portable. Simply drying it has been attempted with some success, but though by this means about 70 per cent of water is driven off, yet, at the same time, a considerable portion of ammoniacal and other gaseous matters are vaporized; thus the manure is impoverished, while the stench of the operation is intolerable. Then, again, it has been mixed with lime, in the way recommended by Davy, but, judging by my own experiments, and those of my neighbours, I am fully persuaded that this is not the most economical way of using nightsoil. The lime certainly dissolves, and partially decomposes it, and the fertilizing effect of a given weight of nightsoil mixed with lime, is clearly not so great as when a similar weight of it is used either by itself, or mixed with some merely drying odour-absorbing substance. There are several preparations of this kind, made in large quantities in London, such as those of Mr Clarke,* and of Mr Lance, the author of the Golden Farmer, all of which, I believe, are excellent manures; but I have not had an opportunity of examining any of their manufactories, except that of Messrs Poittevin. The preparation of these gentlemen is the same as that so successfully carried into effect by M. Payen at Paris: it combines, and successfully too, the great object of driving off the water of nightsoil by a gentle heat, after all its gaseous matters have been absorbed, by mixing with it a portion of newly prepared carbon, in the finest possible state of division, than which, no known substance has such great powers of absorption of all gaseous matters like those which abound in, and impart, the disagreeable odour to nightsoil. These purifying powers of charcoal have been long known: the medical man applies it in putrescent cases, the housewife rubs with its powder her tainted meat, and the sailor chars the inside of his water casks for a similar purpose. The presence of the carbon in the manure thus prepared is valuable in two ways; it gradually combines with the oxygen of the atmosphere, forming in the state of carbonic acid gas the food of plants; and, at the same time, all the gaseous matters of putrefaction with which it is saturated are thus preserved, stored up as it were, for the service of the roots of the cultivator's crops; nothing is lost, the emission of the gases from the slowly dissolving charcoal being so gradual, as to be almost, if not entirely, imperceptible to the senses.

---

* We have tried three hogsheads of Clarke's desiccated compost in comparison with farm-yard dung, bone-dust, pigeon-dung, and a compost of 27 parts of dried mossy turf, with 1 of hot lime shells, in raising turnips on fine sharp turnip soil, and found the crop from it every whit as poor as that from the soil itself without any manure at all.—EDITOR.

Such, then, are the principal facts already ascertained with regard to the fertilizing uses of nightsoil and other decomposing manures, in their ordinary form, and when reduced by various processes to such a state of dryness, so as to be easily applied in the state of powder to the soil by the drill. In thus investigating the advantages of rendering manures more concentrated, I have been induced chiefly to confine my attention to one only of the organic manures, nightsoil, because, from its nature, cheapness, and powerful effect, it affords, perhaps, greater facilities for accomplishing this important object, than any other excrement, and is, besides, more commonly wasted than any other fertilizers. I hardly deem it necessary to make any remarks upon the importance of all researches which tend to the better understanding of the powers and best mode of employing manures, for, with such investigations, is inseparably connected the gradual and steady increase of the productiveness of our country. Such improvements, too, are full of interest, not only to the cultivator, but to every one to whom the vegetable kingdom is an object of interest. And, as I have elsewhere had occasion to remark, it is hardly possible in reflecting upon the essential use of organic fertilizers in the production of our food, to avoid being impressed with the wisdom and beneficence of the Creator in thus making decomposing noxious organic substances the nutriment of vegetation, rendering the very animal substances which the grass once formed its food when dead. This interchange of their elements, so essential to each, is equally incessant and remarkable, the death and decomposition of the one ever imparting fresh food and life to the other. Thus the same gases which are at one moment constituting the noxious products of putrefaction are, in the next, existing in the exquisite aroma of the flower. These facts are, indeed, too apparent to escape our observation, and the marvellous rapidity and advantage to us of these magic vegetable combinations, cannot but excite both our curiosity and our gratitude.

AGRICULTURE OF HINDOSTAN.—NO. V.

ON THE CULTURE OF SILK.

The greatness of the British Empire has now become so identified with the maintenance of our eastern possessions, that our national glory, as well as our national interests, are inseparably mixed up with their prosperity—with their freedom from intestine rebellion, and from foreign aggression. Every year is adding to the responsibility of our rulers, if they neglect to initiate the Hindoos in all the arts that tend to meliorate and sweeten civilized life, and thus to lighten to them the bond of that yoke under which they are held. This is the more necessary as we are continually adding to our conquests, which now stretch over the Himalah mountains to Herat, and the very confines of Persia,—an extent of territory which can only be held by a spell, by an idea of the invincibility of the British arms. Should it ever happen that, in our endeavours to retain these remote provinces, our troops should, by accidental misfortune, suffer a defeat, woe, then, would be ours, for opportunities neglected, and for time thrown away. Disaster to the British arms would be at once the signal of revolt to many a half satisfied Rajah,—districts which were weak, because disunited, might become fearfully powerful when combined,—and through Russian intrigue and ambition at the Persian court, a way might be found through the country of Darius for the powerful armaments of the Czar.

Our only hold on our eastern possessions, therefore, must ultimately be in our teaching the natives the blessings of civilization, under a sway at once combining gentleness and power, opening up to them an extended market for the productions of their industry, and doing away as much as in us lies many of those absurd prohibitions on commerce, which form at present an insurmountable barrier to the interchange of agricultural and manufactured produce between Great Britain and her colonies.

In the series of papers which we have devoted to a consideration of the Agriculture of Hindostan, we have had the object principally in view of shewing, that many articles of consumption in this country, which are at present supplied to us by foreign states, might be equally well, and in some cases better, furnished by our colonies; and that it is only by the unrestrained skill and enterprise of British settlers, stimulating the natives to exertion, and shewing practically the blessings resulting from industry, when duly protected, that the mighty resources of our eastern possessions can be efficiently elicited. When under British sway, the Hindoo becomes enriched and improved, then, and then only, will he be Christianized; and, not until he be Christianized, can his interests and our own become inseparably and permanently identified.

From what we have already written regarding the agriculture of Hindostan it will be seen, that there is scarcely any variety of colonial produce which may not be supplied to us from our eastern possessions. Their vast extent of boundary, and their infinite variety of soil, comprehends almost every kind of product, and, if duly attended to, might render us wholly independent of every other part of the world. That these advantages have not been laid hold on, is a circumstance sufficiently to be lamented; and also that, until within the last very few years, India has been looked upon only as a gigantic military station, and not as a field for European adventure in arts, commerce, and manufactures.

Having already expended what we have to say regarding the principal articles of Hindostanee agricultural produce, and also on the grand new fields opened up in the culture of the tea plant, whereby we may be rendered independent of the Chinese, this series will be now brought to a conclusion, by our directing attention to another product of India, which has never received the attention it deserves, and which, we confidently predict, would answer the most sanguine expectations, if sufficiently attended to—we mean Silk.

Hitherto Great Britain has, in a great measure, depended for the supply of silk upon Italy, France, Syria, and China,—quite overlooking the encouragement of the raw article in our Indian empire. Here a vast field for prosperous speculation opens up before us. The use of silks is daily and yearly increasing, and, in articles of dress, is now used from the highest to even the lowest among the people,—a truth, which requires no other attestation than the fact, that more than four and a half million pounds of raw silk are annually imported into Great Britain for the use of our manufactures.

The climate best adapted for the silk-worm is the borders of a mountainous or high country, where the atmosphere is warm, yet temperate and regular. Thus, in Europe, we find, that it thrives best in Piedmont, the Milanese, and the Tyrol, —all countries bordering on the Alps; and where we observe it thriving in the north of Italy, it is in the neighbourhood of the mountains, where the sky is clear, and the atmosphere balmy. The worm produced in the valleys, where the warmth is great and the air less dry, exudes a looser and more irregular fibre; and the thread formed from it is more glutinous and harsh. For these reasons, it will also be found, that the high table-lands of the Deccan, situated beyond that extensive barrier of hills called the Western Ghauts, hold out superior advantages for the production of silk to the flat low plains of

Bengal, which are more exposed to the extremes of humidity and scorching heat. Perhaps, indeed, no country in the world holds out such natural advantages as that we have just mentioned, for the cultivation of the white mulberry and the rearing of silk-worms.

Even in Italy, for instance, they dare not strip the leaves from the trees more than once during the season, so that they can have only one crop of silk during the year; whereas in the Deccan the mulberry trees thrive with the utmost luxuriance, and being in perpetual vegetation, may be deprived of their leaves at least six times annually, without the slightest injury, provided a few leaves are left at the extremities of the branches. So quick is the process of vegetation, that fresh ones very soon burst forth to supply the places of those that have been removed, and the worm is also so rapid in its operations, and so vigorous, as to be able to make use of the whole of this abundant supply.

With regard also to manual labour, it is so cheap in the Deccan, in consequence of the habits of the natives, that a Hindoo woman is paid at about the rate of fourpence a-day only, and a man at a penny or twopence more; whereas in Europe, wages are very considerably higher. Nor in Italy can the egg be hatched, or the worm reared, without having recourse to stoves and warm currents of air to heat the rooms, and, from the sudden changes in the atmosphere, the insect is liable to disease; whereas in the Deccan, none of these disadvantages are laboured under, the silk-worm being there in its natural climate, and acquiring no artificial aid. From its great elevation, from the mildness of the rains, from its temperature, its dryness, and regularity, no climate in the world equals the Deccan for the production of silk; yet how have these things been taken advantage of? In Italy with a thousand drawbacks, silk has long been cultivated, and is become one of the grand sources of national wealth, and its product gives employment to multitudes of the inhabitants of that country, as well as to those of the south of France. It is a marvellous thing, that we should there look for the raw material for our manufacture of ribbons, silks, and velvets, damasks, brocades, satins, crapes, bombazeens, poplins, shawls,

&c., when from our own Indian provinces the same material can be supplied, at once more cheaply and more abundantly, even as it is, with a thousand drawbacks, and could be, with overwhelming advantages, were sufficient encouragements given, and a protecting hand held out for men of skill, enterprize, and capital, to engage in this most promising department of oriental speculation.]

Nothing can be more convincing, as well as more philanthropic, than Mr Graham's reasonings on this very important subject. We quote that gentleman's words. "Instead of raising raw silk in the Deccan, a considerable quantity is annually imported from China. This is throwsted by the most rude machinery for their own domestic consumption. The weavers work it up into silken cloths, or mixtures of silk and cotton, which the Hindoo ladies wear on gala days and grand public occasions. The delicacy of the fingers of the Hindoo are particularly fitted for handling, reeling, and winding silk ; and were they to meet with due encouragement, they could produce not only as much as they might require for their own use, but also be able, in time, to supply the market of Great Britain. From such an arrangement, both countries would derive mutual benefit ; whilst valuable remittances would be sent to England, an increased circulation of money would take place among our native subjects in India.

"When we recollect that nearly the whole of the vast Chinese empire is clothed in this durable and elegant material, and that the European nations are fast adopting the same dress, the importance of meeting from our own territories the increasing consumption of raw silk will appear evident. When we also consider how much of the wealth of India we have received, and how little has returned to it ; when we reflect on the vast number of miserable and degraded fellow-creatures in that country, who have equal claims with the natives of Africa, to the sympathy of England ; when we consider, that multitudes of them are unable to procure work, though they are willing to labour almost for nothing,—the encouragement of the plan here recommended, will appear to be an object of no ordinary magnitude. It would afford employment to thousands in rearing of trees, picking of leaves, attending to the feeding and cleaning of the worms, in sorting cocoons, in reeling, winding, and throwsting, and in dyeing and weaving the silk varieties. Such a prospect may well arrest the attention of so generous and benevolent a nation as Britain, and awaken her to a due consideration of the real value of her extensive empire in the East, and constrain her to find employment for her subjects in the Deccan, by encouraging the extensive culture of silk."*

Having thus premised on the importance of the subject in hand, let us now to the subject itself.

---

* Means of Ameliorating India, p. 35–36.

The Italian mode of cultivation is as follows: First, there are growers of mulberry trees, who, when these have arrived at sufficient size to allow of the leaves being plucked without injury to them, pluck and sell them by weight to the breeders of the worms. Of the worm-breeders there are two sorts;—first, those who sell the eggs, reserving a sufficient quantity for keeping up the stock; and next those who purchase them merely to feed the animal until it spins its nut or cocoon. As the worm in the course of its various transmutations, being again called to life and activity, would otherwise break all the fibres it had spun, in eating its way out, this nut or cocoon is either baked or suffocated by steam. The latter is the method preferred; the cocoons being apt to be partially burnt in the process of baking, unless great care be used in the operation.

A third variety of breeders purchase the cocoons from the second; and their province is to draw the fibres from them to form the thread. This process is termed reeling or filaturing the silk, and is thus performed. The cocoons being first sorted according to the various sizes of the fibres upon them, the quantity of cocoons intended to form the thread is then put into a small basin of hot water, which enables the fibres to run freely from them. These fibres are then passed through an eye in a small wire, held above the basin, and, in joining them together, a slight twist is given, which produces an elasticity in the thread; and the greater this is in degree, the more valuable is the silk reckoned.

This process finished, the threads are fastened to a reel, which is not circular, but should be formed of four projecting sticks of wood with even tops to them, about one inch broad and four inches wide, with borders at each end to prevent the silk in reeling from slipping off. The reel is then turned round, and the fibres drawn from the cocoon till a skein is made. Particular care should at same time be taken that the cocoons during the drawing of the fibres be brushed with a small birch broom, in order that they may be properly loosened, and the cocoons kept free from the fluff which gathers upon them, for this renders the thread woolly and wasty; and great attention should be paid that only a given quantity of fibres be drawn at a time, otherwise the thread becomes uneven, a thing most prejudicial to the quality of the silk, and essentially spoiling it for many purposes of manufacture.

The Chinese method of reeling is a still more simple process. First of all a small jar is placed on the ground, a charcoal fire is kindled within it, and over it is placed a basin of water. When the water has attained a certain temperature, the cocoons are thrown into it. While this mode of softening is being performed, a small wheel made of bamboo cuttings is placed on the edge of the basin. This wheel is but two inches and a half in diameter, and has a small eye in front of its stand, through which the thread of the silk is to pass as it rises in fibres out of the basin, during which process it is cleaned from adventitious matter, and freed from too much moisture. The skeins of silk are then wound on the large reeling-wheel, which is placed on the left-hand side of the basin.

Our Chinaman then sits down, all being ready, in front of the whole, and, putting one of his chop-sticks between the fore and middle finger, and the other between the middle and ring finger of his right hand, he uses them as dexterously as if these were mere elongations of his fingers, and thus escapes the scalding of the hot water. After stirring the balls about till the gum which glues the threads together is dissolved, he commences unravelling such as run most freely, and, making up eight or ten of them into a common thread, passes it through the small eye in front of the stand of the small wheel. This thread is first conveyed from the eye over the top of the small wheel, and then brought back again by the bottom, where it is twisted into a kind of easily running knot, giving compactness and strength to the thread as it passes on to the large reeling-wheel, to one of whose spokes it is now tied. The large wheel is then turned with the left hand, by which the silken thread is wound up; and the small wheel being also thus caused to revolve, the cocoons are at same time unravelled. While thus employed, the chop-sticks are not idle, for with these he gives a rotatory motion to the cocoons in the basin, by producing a vortex in the water, which keeps them continually revolving. He then goes on more rapidly and dexterously with his operations, increasing the speed of his wheels, and the application of his chop-sticks, keeps up the vortex in the water, throws out the exuviæ or skins remaining after the thread is run off, preserves the cocoons in clear running order, and keeps up the same number. When a cocoon is nearly run out, he pushes another into the heart of the vortex, and makes it immediately to form part of the thread in hand.

Although this Chinese method must be acknowledged as inferior to that of Italy, it is owing much less to the defect of the instruments employed than to the carelessness of the reeler. There not being the same demand in India and China for the fine material as there is for the coarse raw silk, less attention has been directed to this important operation. A decided advantage which the Chinese possesses over the Italian instrument will be found in many circumstances. It requires very little fuel, can be managed by a single person, and used in the corner of the meanest hut. Hence it might be easily introduced into the habitations of the Hindoos and Musselmans, and afford a means of employment which might prove greatly instrumental in raising them from their present state of abject misery to comparative domestic comfort; for, whatever Utopian philosophers may say, the tone of moral feeling is too apt to be regulated by the means of subsistence.

The next processes which silk undergoes—the winding and throwsting—have been in use among the Hindoos from immemorial time. A skein of raw silk is placed on a slight swift, made of bamboos, and a woman sitting on the floor makes the swift revolve with her foot. In her hand she holds a distaff, which receives the silk as it is unravelled. The distaff is then placed on the ground, and the skein is drawn off into silken bobbins. The process of throwsting is extremely tedious and complicated, as practised in the Deccan, where it seems to be confined generally to particular families. The apparatus is quite rude, and worthy of the primitive ages. From a few bobbins, the thread is wound into skeins by a revolving wheel, about a foot and half in diameter. Each thread receives a twist in a particular direction, by the revolving of the spindles, and passes on to the wheel.

This forms the weft for the weaver; but to form the skeins into the warp for cloth, they are transferred from swifts such as those mentioned above, and wound upon distaffs, from every two of which the thread is run off upon single bobbins. These are carried back to the throwsting-mill, to undergo the same process as was gone through before, when making the weft, with this only difference, that the two threads of each are now twisted into one, in a direction opposite to that formerly given.

When alluding to this process of Indian throwsting, Mr Graham very pertinently observes, that "any person acquainted with the mode of twisting silk, or who may have seen an English throwsting-mill, will readily perceive what a blessing the introduction of some part of our throwsting machinery would be among the Hindoos, that, by reducing the labour many hundred-fold, it would tend to cheapen a clothing of which all classes are particularly fond, and would increase its consumption to a very great extent, in a climate so peculiarly adapted to silken raiments."

So delicate is the nature of silk, that even the situation of the filatures for reeling it should be particularly attended to. They should be, when the air is pure, temperate, regular, and dry, and in the neighbourhood of good soft water, which is of the utmost consequence, as none but what is soft, or made so by artificial means, would do. It is therefore always better to have the water drawn into a large cistern, and stand exposed to the sun for some time, in order that it may penetrate and soften it. Even a cloudy day will have an injurious effect upon silk, and the reeling should, if possible, be avoided on such occasions. It has been remarked that, in Bengal, where they have several harvests, those silks which are filatured in the rainy season, are always much inferior in colour, and more wasty and loose in thread. The valuable properties of silks are, that they be clear in colour, and that the threads be clean, even, and elastic. The clearness of the colour is produced by the pureness of the atmosphere in which the worm is bred, and the care taken to filature the cocoon in a proper situation. The evenness of the thread is dependent on the regularity of the number of cocoons used in producing it, and its elasticity is acquired by having pure soft water in use, heated to a degree somewhat beyond tepid.*

To avoid the bad consequences occasioned by variableness of climate in the drying of silk, condition-rooms were founded by the French Government at Lyons in 1805, a circumstance which Dr Lardner has somewhat curiously overlooked in his treatise on the manufacture of silk. Impressed with the beneficial results likely to accrue from following up this plan in a climate so variable as that of Bengal, Mr Shakespear addressed a letter to the Board of Trade in 1832, on this subject, having previously carried the plan into effect at the East India Company's Gonatea and Rangamatee factories.

He thus writes on the subject:—" Fully impressed with an opinion that the principle, if practically followed up in these factories, would be infinitely beneficial in protecting newly spun silk from the sudden changes of weather in Bengal, and the extreme humidity of the atmosphere acting upon so absorbent a fibre, especially during the manufacture of the cocoons silk of rainy bunds (which are reeled off with all practicable expedition in their green state, or unovened), I have not hesitated to fit up with glass-doors, Venetians, and shutters, a large old godouin at Rangamattee (measuring 40 feet by 30), as a 'condition or drying room,' in which are placed two pair of my pottery ghye stoves, having hemispherical tops (in substitution of the cocoon basins). Thus, a moderate temperature by no means oppressive, regulated by a thermometer and ventilator, may at all times be kept up, and the room being glazed, the process of weighing, sorting, and packing, will all be carried on with great security in the worst weather, now altogether impracticable, without the certainty of the bales being packed damp, an evil so much complained of at the Export Warehouse, and by the brokers in London; the injury increasing by the heat of the ship's hold.

" The new silk of each day will be hung up in the usual masses or bundles of skeins, or distributed on horses and shelves made for the purpose, and thus remain twenty-four or forty-eight hours, according to circumstances, before being weighed, sorted, and embaled. The *decrease in weight* will be very trifling, no factitious practices being resorted to by the operatives in Bengal as in Europe, by the throwters, to moisten and increase the weight by soap and dirt, which is there paid for as silk by the manufacturer.

" I am induced to hope, that the effect of this arrangement may prove beneficial to the investment, consequently satisfactory to your Board, and that it may accordingly be brought to the notice of Government as an expedient hitherto, I believe, never thought of or had recourse to at any of the Honourable Company's Factories. *Qui non* proficit deficit."

---

* See, on the subject of Raw Silk, an excellent practical paper by Mr Norton of Madras, printed in Vol. II. of the Indian Agricultural Transactions, p. 129, et seq.

The board not only countenanced the experiment made by Mr Shakespear, but, by their secretary Mr Macnaughten, sanctioned the expenditure, and ordered the same to be repaid, with a letter of thanks; and in the following year, 1833, many hundred bales of silk were packed in a state of "dryage" and perfection hitherto unknown.

The Indian mulberry plant is not allowed to rise above a foot and a half or two feet; and from the frequent cuttings it is exhausted about the third year, and obliged to be rooted out. It is however easily renewed by cuttings, and planted in rows with just enough of room between to admit of weeding, dressing, and earthing up the roots. At Darwar and Poona, a different method has been pursued for the last eighteen years; the mulberry cuttings being allowed to grow to the height of three or four feet; and as they are always irrigated, they are luxuriant at this height, and are not rooted out under seven years. Mr Reid the Government secretary gives it as his opinion, that the oftener the mulberry is cut, the finer and tenderer the leaves become. At Poona and Ahmednuggur, plantations were formed in 1833 and 1834, after the Italian plan; and the cuttings, having struck, were transplanted, and set from eight to twelve feet apart, and trained up as standard trees, with the purpose of not being gathered for four years.

Regarding this plan several queries suggest themselves. Will the leaves be improved or otherwise, as food for the worms by being produced, in such a climate as that of Bengal, from old trees? And, if the leaves are improved by age, and produce a larger crop as they grow older, will any supposable rate of profit compensate for the capital of a silk farm lying dormant for four years, and in a country where irrigation is necessary?

Of course it is not intended here to enter into any account regarding the management of silk-worms. The animal itself seems to be a native of China. The kind commonly reared for the production of silk is the *Phalæna Bombyx*, although the *Phalæna Atlas* is said to yield it more profusely. The manufacture of silk was introduced into Europe about the middle of the 6th century by two monks, who brought great quantities of the worms from India to Constantinople. The first great manufactories were at Athens, Thebes, and Corinth, and thence the enterprising Venetians supplied with it the Western States of Europe. Italy and Spain next engaged in the manufacture; it was taken up by the French somewhat before the reign of Francis the First; and we find a company of silk weavers in England in 1455.

With regard to the mulberry trees, we find that four varieties are cultivated in India as food for the silk-worm. These are the *Morus nigra* or common officinal, the only species general in England, and used in some parts of France and Italy:—the *Morus latifolia*, leaves *rough*, and variously divided; this is a large tree common in the gardens of the Deccan, but the worms do not thrive well upon it:—the *Morus Indica*, leaves *smooth*, entire or divided, heart-shaped, *equal* at the base, fruit deep purple, stem shrubby and diffuse: —and the *Morus alba*, leaves also smooth, but *unequal*, at the base; fruit whitish or *variously coloured*, pink or purple: stem *arborescent*, *varieties*.

"It is astonishing," as Monsieur de Verinne states in his communication to Mr Robison, secretary to the Agricultural Society of India, "to observe that no advantage is taken of the wide field open in this country for the improvement in the cultivation of the mulberry tree; more especially that species which is known to be the best adapted for the food of the silk worm, either as standards, half-standards, dwarf-standards, or shrubs; and the breeding and rearing of silk-worms, by those who are properly acquainted with the minutiæ of this particular study, and the fact is, that those who do really understand it, do not meet with the proper support and encouragement they require; and when this is wanting, no material improvement will ever take place in this branch of Indian commerce."

It may be proper to remark here, that according to Mr Shakespear, the Company's resident at Rangamattee, and the introducer of the drying rooms for silk into India, that, with regard to the mulberry tree, the Cabinet Cyclopædia volume of Dr Lardner, on the Culture and Manufacture of

Silk, "is full of loose statements and contradictions regarding the species used in India, China," &c.;. the inference being, that very little is accurately known, and the Doctor quite abroad on the subject.

In China they have three kinds of worms, the largest when fit for spinning, is about three inches long, and of a black colour. Three crops of a deep yellow coloured silk can be obtained yearly from this species. This worm is the most expensive; and four and a half frames thickly set with them are sold for two dollars. The worms on these will have consumed one hundred and eighty pounds of leaves in their progress, and will produce two pounds of pure silk. The cocoon produced by this worm is about two and half inches long, and two in circumference—yeilding strong sorts of silks used in the manufacture of Chinese broad-cloths.

The second class of worm producing the white silk is extensively fed in China. It is smaller than any of the others, and completes its stages in twenty days.

The third kind resembles the common worm of India, but produees silk of a stronger fibre; and completes its stages in twenty-three days. One hundred and eighty pounds of leaves are required to feed seven frames of the white worm; and rather more for the third kind. The seven frames are bought for a dollar, and will produce about a pound of pure silk. From each of the latter kinds, six crops a-year can be obtained. From the first species the Tusset silk so much used by the Brahmins in Bengal is manufactured.* It is of course, dark coloured, and most durable; and might be introduced with great advantage into the south of Europe and America, where a dress light and cool, yet not costly, is much wanted.

If we wish to retain our Indian possessions, and this can only be by our raising their population in the scale of humanity, by adding to their comforts, removing their grievances, and improving the country, we know of no individual product so likely to accomplish these ends extensively, or so likely to answer public expectation, as the culture of silk. As a product of India, it is entitled to consideration as of the first class. When we reflect that, in Great Britain, the demand for it is annually increasing, and that, from being an article of dress worn only by the rich, it has come into use not only among the middle but among the lower classes, it is evident that no limit could be put to the demand for it. Add to this, that the enormous quantity of more than five millions of pounds of raw silk is now yearly imported into this country for the use of our manufactures, and that, instead of encouraging, by every means in our power, its cultivation in our Indian empire, we have hitherto almost entirely depended for our supply on Italy, France, Syria, and China. Yet, strange to say, its cultivation has never been tried on the western side of India till very lately; and perhaps no other country in the world is so well calculated for the rearing of silk-worms, and the thriving of the white mulberry, as the high table-lands of the Deccan, situated beyond that extensive barrier of hills called the Western Ghauts.

---

* *Vide* Dr Roxburgh's account of the Tusset and Arrundy silk-worms.

On this subject Mr Graham well observes:—"The climate of the Deccan, from its great elevation, from the mildness of the rains, from its temperature, dryness, and equability, is the most congenial to the silk-worm of any in the world; yet, notwithstanding these decided advantages for the cultivation of silk in the Deccan, it has been hitherto neglected, while in Italy, with all its natural disadvantages, silk has been long cultivated, and is become the grand source of the national wealth. The cultivation of it gives employment to multitudes of the inhabitants of Italy, as well as to many in the south of France. They supply England with the fine raw material for her manufacture of ribbons, silks, and velvets, damasks, brocades, satins, crapes, bombazeens, poplins, shawls, &c., and yet her own India could furnish her with the same material more abundantly and cheaply, if she would but stretch out a helping hand, and encourage men of skill, capital, and enterprise, to proceed there, and engage in this promising department."*

We have now brought this series of papers to a conclusion, and sincerely trust that they may tend to produce a practical effect. Our Indian empire is too extensive and mighty to hold together, unless we bind it to us by the chains of gratitude and kindness, and elevate the natives in the scale of morality and religion. As a Christian nation, we should be ashamed of acting the part of mere conquerors; and, looking towards Persia and Russia, we should remember that what has been obtained by force may be taken away by force. Our hold on India must be of a firmer tenure than mere military sway. Let us instruct the inhabitants in agriculture and manufactures; let us shew them habits of economy, industry, and integrity, and the comforts that necessarily flow from these; and by the establishment of schools, let us train up the rising generation in the paths of moral and religious enlightenment. The British who have hitherto been sent out to India (we speak in general terms), have been intended to direct the talents of a rude people in the arts of warfare, and with that people they have no common interest, and no common pursuits. They are necessarily ignorant of the real state of the natives, and are shut out from that knowledge by their rank, habits, occupations, and prejudices. But let a different plan be tried; let those who proceed to settle in India, instead of being young men whose education seldom embraces more than the bare principles of science, and scarcely any practical acquaintance with the useful arts, be settlers of a different sort, and other results will flow from their influence and example, than what we have hitherto been doomed to witness. Then, and not till then, will the interest of the Hindoo be identified with that of the Briton,—and then, but not till then, will Hindostan, instead of being a prurient excrescence, become a healthy integral part of the British empire. We know what it has hitherto been, and we have shewn from its natural capabilities what it may be made. Honour, justice, self-interest, impel us on; and in a national point of view, we should remember that, " as we now sow so shall we hereafter reap."

---

* Means of Ameliorating India, p. 34–5.

ON THE ADULTERATION OF BONE-DUST.

By Mr James Halkett, New Scone, Perthshire.

Having been for the last ten years engaged in the bone trade, I have had considerable experience in the quality of bone-dust, and have been a pretty attentive observer of its operation on different soils and in different seasons. I shall, therefore, now endeavour to give a statement of some of my observations on the subject, and shall commence with the article itself, about the qualities of which I am sorry to say much misapprehension exists.

It is useless to state, that bones now-a-days are not allowed to lie about the pastures, in order to give the cows a day's unprofitable work in chewing them. But that, since their value has been ascertained, they are now much better taken care of, and few are lost either in town or country. So that the necessary paraphernalia of a farm-steading cannot be complete, without a large old cask in the inner corner of the cart shed, or some other place, to collect them in, and to which a cover is indispensable, to keep out dogs, cats, and rats, all of which would purloin them without such precaution.

Bones are collected in great quantities in London: the bone-boilers there send round their spring-carts every day to the butchers, to inns, eating-houses, &c. for the purpose of collecting them. After they are taken home, men are employed with short-handled axes, to chop them into small pieces on a stock, and pitch them into the boilers. When well boiled the fat is skimmed of, and as the bone-boiler is generally also a soap-boiler, part of it is used for soap, and the coarser part for coach and cart grease. When the bone-boiler has a bone-mill he does not require to chop them with axes, but puts them through his coarsest breaking cylinders, and then into the boilers. When no more fat can be extracted the bones are then put out to the yard, where I have seen stacks of them as high as a three-storey house. They are afterwards sold to the crushers at so much per chaldron, which consists of thirty-six heaped bushels. It may be asked why they are sold by measure, and not by ton, as foreign bones are? But the measure for them is by far the fairest, as if sold new from the boiler, and consequently very wet, a chaldron of them would weigh nearly double what they would if dry; but by the chaldron, whether wet or dry, you have nearly the same quantity. A considerable quantity of these bones are sent to Hull and other towns along the east coast, and there are several mills in London which crush them.

Although thus an immense quantity of bones are yearly collected in Britain, how would all these satisfy our enormous consumption, were it not for the quantity imported from the

Baltic and other ports on the continent. There is hardly a seaport-town on the east coast of England or Scotland (what may be on the west I do not know) of any consequence, which has not got one or more bone-mills, and yearly imports a number of cargoes of foreign bones. But the great emporium is Hull, where I have seen thirty or forty cargoes at once in one dock delivering, or to be delivered, of bones. These were destined to be crushed in and around Hull, and quantities were transferred to river sloops, to be carried into the interior of the country.

The declared value of the bones imported into Britain in 1823 was but L.14,395 ; in 1837 it was L.254,600, and since that must have greatly increased. They are almost all ordered from commercial houses in Hamburgh, who have ramifications in every seaport on the continent, and are shipped in foreign bottoms at much less freight than they could be in British ships. The duty here is one per cent. on the value. But as we want them, and they do not, some of the foreign powers are proposing to impose a duty on them. The cargo and freight are, for the most part, paid on the quantity delivered by the custom-house scales, and a cargo always comes short of what it is stated to contain.

Bones are always crushed for manure by toothed-cylinders, of which some mills have three pairs, others two, and some only one. In Yorkshire the bones are ground into three sizes ; the first is made to pass through a sieve of little more than a quarter of an inch calibre, the second is called half-inch, but I have always found it too large to pass through a half-inch sieve, and the third is inch-size, which, in this neighbourhood, we consider too large for turnips. The crushers there never mix them unless you order them to do so ; on which they measure them for you separately, and when so mixed, the small falls in between the pieces of the larger size, and when you come to measure it again, you will find that you want nearly a third of your quantity.

The first of these I consider to be the worst in quality ; it consists of earth and sand that have accidentally got into the inside of the hollow bones, the rotten carious parts of them, and those extremely old ones which go into powder on the first touch of the cylinders. On the other hand, there is most matter of some kind or other in a bushel of it. It is far heaviest, will spread furthest over the land, will braird the turnips first, and rush them on fast for a while, but I have often known it desert them long before it should have done so.

The second kind is, when made from good bones, free from the impurities of the first, but when sown by itself, is long in decomposing, long in brairding the plants, and will bring them on but slowly at first, yet, when they do come, will stand by them to the last.

The third kind is never used in this neighbourhood, although quantities of it are shipped to the north of Scotland. But I would recommend that the first and second kinds should be mixed in equal quantities before sowing—the first to braird the turnips, and carry them on before the second is ready to take up its place. And as for the third or drill, that it should be recrushed, and all made to pass through a half-inch sieve, and then I would give it the preference to any of the other two.

In this quarter, viz. in Perthshire, there is seldom any size made but the half inch, with the dust amongst it, just as it comes from the cylinders, which is found to answer best with the turnips. True it is, that if the small and the great were kept separate, there would be more bushels in a ton, and consequently it would pay the crusher better. But as the mixed dust is found to answer best for the raising of turnips, there is no reason for their ever being separated.

I find that numbers of agriculturists, and even scientific men, who have analyzed bones, are of opinion that the marrow and fatty matter in them are of great use in their operation as a manure ; and I must confess that at one time I was led to believe, from its plausibility, and what I thought a common sense view of it, that this was the case. But now, after the test of experience, by numerous trials, between what we call green bones with all the marrow and fat in them, and dry ones free from it, I have always found that the latter raised by far the best crops. Therefore, I have arrived at the conclusion that the less animal fat in them the better, and that the boiling of them before crushing, instead of injuring them, is a benefit.

The next part of the subject I would treat of, I consider to be the most unpleasant part of the duty I have imposed on myself. But although the old adage says, "There is roguery in all trades but ours," I shall proceed to shew, that the bone-trade is not exempt from it, but, on the contrary, there is more deception in it than in almost any other.

There is a great outcry with some agriculturists to have their bone-dust very small; now, this predilection for dust is the cause of their being so often and grossly deceived. If bones be in small pieces, it is easy to detect any other substance amongst them, but if reduced to a powder, it is not so easy to discover if there be any thing else mixed in it.

Several ingredients are used in the adulteration of bone-dust; the first I shall mention I have found to be the most extensively employed, viz. the lime that has been used in tan works to take off the wool and hair from sheep and other skins. It is at first clotted in lumps, and put through the cylinders of the bone-mill; the wool and hair are taken from it, and it is then mixed with a proportion of bone-dust; it appears very small, has a very pungent smell, and, on the whole, pleases the unwary wonderfully.

I am aware that this mixture has often raised a good crop of turnips in damp seasons. I have likewise known it destroy the seed entirely, when good bones beside it did well. I have no objection that it should be used as a manure for turnips, but why call it bone-dust, and not sell it for what it is? I once saw it used by itself, without any admixture of bone-dust, and it proved an utter failure; and I am led to believe that it is the small quantity of bones in it that sometimes raises the crop without any assistance from the lime whatever.

Old plaster lime is also used for the purpose of adulterating it, but I have not seen it in dust nearly to the extent of the former. I need scarcely say that it is smell-less and useless, and should any bits of it be left that is not absolutely reduced to powder, it is easy to detect it, as you will see the hair sticking in it.

Soap-boilers' waste is also used; it is of a bluish-white colour, and very small, but how it operates on the crop I have never had experience.

Dust that is all of a very white colour is made from bones from which a previous manufacture has been taken, such (I understand) as sal ammoniac, &c.; it is of a very hot nature, and, like the tan-pit lime, apt to burn the seed in dry seasons.

These, saw-dust, slaked lime, rotten wood, and numberless other ingredients, are used in the adulteration of bone-dust. And when the purchaser has not the opportunity of watching the process of manufacture, but buys that which is imported from another port, it is absolutely necessary to examine it thoroughly before purchasing; and were agriculturists to pay that attention to the quality of the article they purchase, which they should do, the machinations of the adulterater would prove unavailing.

ON THE AGRICULTURE OF THE COUNTY OF CORK.—PART III.

(Continued from vol. x. p. 528.)

The Baronies of Barrymore and Kilnataloon.—These we shall notice principally as a union, for, combined, they constitute a compact though extensive district, but the latter, if viewed as a distinct locality, would present little matter for our observations. We shall only remark of Kilnataloon, viewed for a moment as an isolated subdivision, that the southern part possesses many demesnes of the gentry, while the remainder is moory, mountainous, and coarse, though improveable, and that, on the portion belonging to the Duke of Devonshire, there are some excellent farm-houses. The united district extends to the harbour of Cork on the south, where it touches upon a vale of limestone stratification, and on the northern extremity it also possesses the advantage of contiguity to the same calcareous manure.

The little village of Watergrasshill in Barrymore, is said to lie on the most elevated spot in the county, but as the ascent from Cork is very gradual, the height is not so apparent as it otherwise would be; a new line of road connecting Mallow with Middleton intersects the road from this village to Cork. The soil here is very poor, and the tillage indifferent. There is an insignificant town—Rathcormack—within the limits of the northern part of the barony, near which is Lisnagar, the residence of Lord Riversdale, a small but improved demesne, in the vicinity of which the houses of the farmers and cottagers are conspicuously neat in their outward appearance, and possibly in the interior too; but of this we cannot form a correct judgment, from our want of time to inspect them. The culture about Rathcormack is by no means bad. The soil around is of varied quality, but there is not much bog here. At the distance of four miles northward, there is a hilly tract called Nagle's Mountains, on the highest of which is a conical pile of stones, called Cairn Thierna, "the Lord's Cairn," from having been the spot where the Tierna or Chieftain met his clan for some unascertained purpose. These hills are of clay-slate formation. This is used in some places, especially in the valleys of the Blackwater, for roofing farm-houses; the strata undulate, and the inclinations of their ridges are from east to west, and the beds incline towards the valleys of the river.

Dairy management is found very valuable in the vicinity of Cork, where even the sour refuse milk (after churning), perfectly coagulated, is regularly sold in summer. The practice is to churn frequently, and this is one great means of having the prime butter for which Cork is distinguished. The Holderness breed of cows has long been a favourite, but any good kind of milch cow is readily purchased by the dairy men at the neighbouring fairs. The southern part of this division is infinitely more favoured in every respect than its northern extremity; besides limestone, sea-sand and sea-weed are at hand; of the former, twelve tons is considered a reasonably good allowance to the acre, but it is very generally used in composts of earth and dung, the latter being frequently brought from the city. Near this—it may be considered a suburban extension—is Glanmire, through which the high road from Dublin and Waterford passes, on the margin of the Cork river, a village of peculiar interest, with many villas surrounding, among which should be particularized Lota, Demkettle, well wooded demesnes of exquisite beauty, and Riverstown, more retiring, but not less respectable. The town of Cove, on the Great Island, containing nearly 7000 inhabitants, was a very unimportant fishing station previously to the late war; but its locality then rendered it at once a place of great *shipping* consequence, for, besides the advantages which its inhabitants derived from constant intercourse with ships of war, trading vessels resorted there in great numbers for convoy protection and all commercial purposes, while the money expended in its vicinity on the erection and maintenance of forts, martello towers, &c., gave a powerful impulse to industry in various departments.

This island forms the northern termination of the harbour, and the views around it are magnificent; marine villas everywhere meet the eye; and as it is the grand rendezvous of the Cork Yacht Club, the boats of its members in summer add considerable interest to its animated and picturesque scenery.

Respecting Barrymore, the survey of 1656 states:—"On the south side there is a valley, through which the river Bryde runneth, which valley is about six miles in length, and about one mile broad, between two hills, affording some limestone quarries, which were needful for manuring of adjacent lands until the firing therewith were consumed. In the midst of the said valley lieth the Bog of Kilcrea, called in the Irish tongue by the name of Gearky, which is about two miles in length and one in breadth, and is very discommodious and unprofitable; the midst of it being woody, bushy, and very deep, inaccessible, and edged on the east and west ends by main red and deep bogs, common receptacles for wolves, to the constant annoyance and detriment of the adjacent inhabitants. The continued burning of lime in the said valley, and borders thereof, hath reduced the soil to a very lean and dry condition, and the lands very black, and not affording fuel for firing but where turf is, nor shelter for cattle. And now the inhabitants are necessitated to fetch sea-sand from Inishanone for manure, and the soil being spent, yields but three crops of corn at each manure."

We should not have taken up space with the foregoing extract, except for the last line; the *but* is a curiosity, and goes farther to indicate the natural fertility of the soil of Ireland, than any testimony of our own.

Lime is greatly used throughout this barony, and also led from it to those adjacent districts which are deficient in this manure; much of it is burnt in what are called running kilns with peat or furze. The old mode was to construct a rude kiln of sods under a high bank, and near a turbary, and some of these are still made use of, but in most instances the kilns are regularly formed of stone, and topped with fire brick or granite stone. The fuel (when peat or furze) is applied at the " eye," and not at the top. By this method, the kiln cannot be replenished until the entire of each successive filling is completely burnt and emptied out. The mode of using lime is still very defective; it is often allowed to lie in the kiln until it becomes carbonate, or to lie in a state of mortar on the land.

It may be interesting to present, in a very curtailed form, the mode of reclaiming waste land, pursued by the late Edward Roche, Esq. of Kildinin, in Barrymore. The area of mountain tract which he undertook to improve, comprehended, at Kildinin,* 1700 acres, which had among its few local advantages, a southern aspect and a gradual declination. The owner built his house and farm offices, and laid out a kitchen garden and nursery of trees, near the boundary between the small portion of cultivated land which he possessed, and the waste, which was composed of heath on peat three feet thick, with a stiff clay subsoil intermixed with quartz. Happily he had a quarry of limestone within the range of a mile. The population of the vicinity being scanty, Mr Roche established settlers on the more remote parts, assigning to each family forty acres and a house built by himself; and as his terms were encouraging, he had no difficulty in obtaining occupants, whom he selected, not from their wealth in money, but from their possession of health, physical power, and moral character. To these he gave leases of thirty-one years, at half a crown an acre, and this rent was to be taken in labour from the tenant, who was privileged to expend his labour in enclosing his own fields during the first seven years. This spirited gentleman constructed limekilns in different quarters of the tract, and allowed limestone to the tenants, who had only to provide turf (which they had on their respective allotments), and to calcine it. They had also the important accommodation of having their fields, when enclosed, ploughed and cross ploughed by the teams of their landlord; after which preliminary labours, the tenants collected the coarse vegetable surface heaps, and reduced it to ashes with a slow and smothered heat. These heaps, which were in the proportion of one to every rood (160 to the acre), and each mixed with a bushel of lime, over which they were carefully thrown until the ensuing spring, when they were spread equally over the surface; the ground was then ploughed into ridges for potatoes, (covered from the trenches with spade and shovel), and let at three guineas per acre.

---

* He improved 500 acres elsewhere.

The next crops were oats on the black peat, and rye on the red: grass seeds were at the same time sown, and the land remained in pasture for three or four years after, a meadow crop in the year succeeding the corn. Afterwards a rotation of cropping commenced.

The report of the Commissioners for Railways, states one year's produce of the limestone-quarries at Rock-farm, on Little Island, in the barony of Barrymore, within four miles of Cork, and on the estuary of the Lee, to have been as follows:—

12,000 tons manufactured, at 13s. per ton } conveyed by wharfs.
44,000 do. rough, at 1s. 3d. per ton . }

The value of a barrel of lime throughout the county may be stated to be 11d. To the brown stone soils, either separately or in composts, it is highly fertilizing; the farmers use it frequently for potatoes as well as corn, and scatter it thinly as a top-dressing for clover after the first cutting.

In comparing the vicinity of Cork with that of Dublin, some striking points of distinction present themselves; and it may be safely asserted, that the agriculture of the former is at least a quarter of a century more backward than that of the other. Although cows are kept for dairy purposes in great numbers near Cork, there is no establishment like that of Mr Roper's or Mr Rourke's near Dublin for supplying milk,—no house-feeding system. There are hundreds of acres in the north liberties entirely under grass, which, if cultivated, would produce 50 per cent. more than in their present state, together with the incalculable advantage of employing the working population. A case in point shall be adduced:—150 acres of medium quality were devoted last year by Mr —— to the feeding of twenty cows and a bull on grass and hay, and the production of hay for a pair of carriage-horses, one cart-horse, and a donkey; nay, not so much, for in the month of March the supply of hay was exhausted, and this *capital farmer* had to purchase what he wanted during the remainder of the season. On another farm demesne of 120 acres, twenty cows and some half dozen pigs were supported in the same year; the tillage consisted of a four-acre field of potatoes, succeeded by wheat or barley, and then oats, followed by potatoes again The owner had neither clover, vetches, turnips, mangel-wurzel, nor rape, though his land was adapted to all of them, and really capable of maintaining 50 per cent. more of stock, if properly treated. To this mode of mismanagement there are, however, many exceptions.

Fermoy, Condons, and Clongibbons.—To avoid prolixity, these baronies, which are on the north-east of Barrymore and Kilnataloon, shall be viewed as a combined tract, bounded on the south by the Blackwater. Very elevated hills on the north and east boundaries, separate the county of Cork from those of Limerick, Tipperary, and Waterford. This is principally a limestone district, and consequently fertile; and besides the natural advantage of good pasturage, artificial shelter has been added. The enclosures are good, hedge-rows frequent, and there is much native wood on the mountain slopes. Mr Hyde, in particular, a gentleman of highly aristocratic family, possesses much oak-wood and coppice. The want of fuel is among the disadvantages of this locality, except in the immediate vicinity of the mountains, where bogs abound. It is hard to describe the modes of agriculture where no fixed system prevails. The general practice, however, was, and still continues in a great degree, to sow wheat, after potatoes cultivated in a very slovenly manner, and to take a crop of barley in the next succession, after two ploughings, so shallow as rather to stimulate the growth of weeds than eradicate them. The crop of barley might have yielded on an average 150 stones to the acre, and then came on a doubly dirty stubble, a crop of oats after a single scratching, covered with earth from the furrows by the shovel. Then the land was suffered to rest under sown grasses of a bad description, or left to take its chance for the natural production of the indigenous vegetation. However, much improvement in this particular has undoubtedly superseded the former barbarous management, potatoes are far better manured, tilled, and *cleaned*, than they used to be, and the wheat crop is consequently of better quality, and more abundant; the stubbles are tolerably well winter-fallowed for barley or oats, which the common farmers are still in the habit of sowing after the wheat. A considerable breadth of clover is cultivated, and turnips have been introduced extensively in the neighbourhood of Fermoy, which boasts of a spirited Agricultural Society recently established. Last year, in that neighbourhood, much of the wheat sown on potato land before Christmas perished from the wetness of the soil, and this, with much previous experience of the failure of winter wheat sown at a *late* period, has confirmed some of the most skilful farmers of the northern parts of the county, in the opinion, that it is better to sow spring-wheat after potatoes, after the first new moon in February, and to the middle of March. Dr Roche has persevered for seven years in this practice on the same farm. He has not changed his seed during this period, and now finds that it has actually acquired all the qualities and peculiarities of a spring wheat, though originally a winter species, according to the established botanical theory regarding the gradual adaptation of plants to climate and circumstances. Dr Roche is also a careful and judicious sheep-breeder; he selects the best gimmers from his own flock, and crosses them with tups most distant in blood, and best suited, from shape, wool, &c. to improve his stock. This gentleman has a fine limestone soil for his sheep-farm adjoining Fermoy, where Mr Denniky also is pre-eminent as a sheep-breeder. Turnip-culture is making rapid advances in this vicinity, so that sheep will soon become a very distinguished stock here. Until lately, as it has been stated to us by an intelligent correspondent, very little care was taken of the sheep, which was left exposed to the pitiless storm in winter, because it had a thick coat of wool, the very reason why it required shelter from rain, for the fleece, saturated with moisture, and retaining it, must occasion *chillness* to the animal, and lay the foundation for disease. Mr Foley of Ballygally, the gentleman to whom our reference applies, has for some years paid attention to turnip culture, for his small flock of sixty-five breeding ewes. He is of opinion that he has sometimes injured them by too high feeding, and the result of his experience is, (but he gives his opinion with characteristic diffidence), that it is better not to give turnips until about a month before lambing time; he then gives a full quantity, with a small supply of hay, until the pastures are sufficiently strong in grass in April. Mr Foley has found no difficulty in leading his young sheep to feed on turnips, which he throws to them on their pasture without cutting. His method of tempting them to their artificial food, is by turning them into the turnip field at the latter end of September or commencement of October; they soon begin to taste the tops, particularly of the Swedes, and very soon commence nibbling the bulb. When they are too expert in this way, they are removed to a bare pasture, where the roots can be thrown to them. Last season, Mr Foley was particularly successful in imparting to his young sheep the relish for turnips, in consequence of the accidental mixture of rape with turnip seed; the lambs first made their advances on the rape plants, and when they had clipped these down, they quickly set to eating the turnips; nor was this in any measure the effect of scanty food, their supply of young grass being abundant, and they were at liberty to graze on it if they pleased, as there was not a fence at that time to separate them from the pasture part of the field. This gentleman is so strongly impressed with the good results of sheep-sheds, that he has a long range of them in course of erection. We heartily wish that our more northern friends, who have so much more occasion for them, would imitate the example of Mr Foley in this particular, and save their poor sheep from the misery which they so often endure in winter and spring, when folded in our turnip fields without even a bank, or hedge, or tree, that deserves the name of shelter. The soil near the Blackwater, though far less rich than that of Limerick, is more easily worked, from its greater dryness; and all cattle here are of a description far superior to the breed in the southern parts of the county.

Though the improved system is too slowly advancing in some of the more northern baronies, Fermoy, Condons, and Clongibbon have progressed with comparative rapidity. Turnip culture is by no means now considered as only fit for *gentlemen* who can afford to amuse themselves in making unprofitable experiments, and do not depend on the returns of their land for the means of their support. They are now grown in several districts by every farmer sufficiently intelligent to perceive that cattle fed on turnips will pay from 100 to 150 per cent. for their keep during five months, and that sheep fed on the tops (when the bulbs are being removed to the cattle), with a succession of rape for their exclusive use, will pay nearly an equal profit. But there are, at the same time, many here who calculate on potatoes for the market as a more profitable crop than turnips, but their calculations are incorrect, as may appear from this calculation. A crop of potatoes must be grown on good land, and well manured, to produce ten tons (this is much too high as an average), which, at the present rate in Cork, are worth L.18, 5s. Supposing these potatoes to be taken to market, the labour of twenty horses at 2s. 6d. per day must be deducted, which leaves L.15, 15s. for the crop.

A good crop of turnips will certainly fatten two beasts per acre, at 100 per cent. profit on each. Thus, two beasts bought in November for L.16 will fetch in March or April following L.32, leaving L.16 profit, or 5s. more than the return of the potato crop; but the great profit is through the manure made at home by turnips, which the potatoes do not admit of in the case supposed. The manure from a single cow during winter and spring (taking our estimate from Dublin), is worth 50s.* The carriage, five miles from the city, is estimated at 50s. more—L.5 when on the farm. In Cork the dung of a cow is not to be purchased at all. Her manure (we are assuming that she has abundance of straw), with full turnip feeding, may be estimated at twenty tons—L.5.

---

* City dung, of very *inferior* quality, sells from 5s. to 7s. per load.

The account then stands thus :

Potatoes sold in market,	L.15 15 0	Profit on two cows fed on turnips,	L.16 0 0
Balance in favour of turnips,	5 5 0	Value of manure,	5 0 0
	L.21 0 0		L.21 0 0

" The straw, however, if sold in market, would have brought a good sum ;" true, but we may well place against this apparent advantage in favour of potatoes, that the land is improved *much more* than the amount of the difference, by being under turnip culture, in preference to the exhausting potato crop. If potatoes be used for cattle-feeding instead of turnips, the reply is, that it would require the produce of two acres, or twenty tons at least, to fatten two beasts in five months at the very moderate allowance of 160 stone per week, which would be insufficient without *hay;* with double the weight of turnips (which the acre would yield) straw would answer perfectly well.

With the town and vicinity of Fermoy, the name of the late John Anderson is so closely associated, that we must pay a passing tribute to the zeal and energy, and extraordinary talents, of that remarkable individual. Mr Anderson came from Scotland to Fermoy in 1791, and purchased the greater part of the manor of Fermoy. The town itself was at that time a miserable assemblage of straggling and dilapidated houses, with only one carriers' inn for the accommodation of travellers of any class. These he soon levelled to the earth, while on their site he laid down uniform streets, and built commodious and substantial houses, with a hotel establishment, and all its adjuncts of stables, coach-houses, and coachmakers' sheds, which astonished the natives of every degree. Fortunately for Mr Anderson, the situation of Fermoy, twenty miles from Cork, and on a river, with few bridges, and not easily fordable, rendered it an eligible position for the military during the war with France, and the Rebellion at home; and the government closed with the overtures of Mr Anderson for erecting Cavalry and Infantry Barracks on a grand and extensive scale. He gave an area of sixteen acres for the purpose, and as long as troops occupied the barracks, which were soon fit for the purpose, the town of Fermoy flourished, and Mr Anderson grew rich. House-rent became high; every roof was in demand; families connected with the numerous military then always stationed there, and artisans and shopkeepers, crowded into the town, and rendered it a place of bustling occupation, and of amusement too. Old roads were repaired, new lines opened, mail coaches established, and a noble bridge was then built over the river from the main street, on the mail-coach road between Dublin and Cork, and the proprietor himself built a very handsome mansion-house for himself on some flat alluvial land adjoining. When foreign and domestic peace were, happily for the empire, re-established, Fermoy lost its military, and with them the source of employment for the numerous train of tradesmen who administered to their wants; and it is matter of deep regret that Mr Anderson vested a large proportion of the property which he had so honourably acquired in the purchase of estates in the neighbourhood, which, from the rapid decline in the value of agricultural produce consequent on the abrupt transition from a state of warfare to that of peace, proved a very disadvantageous purchase. Mr Anderson, most deservedly, obtained a baronetcy in 1813.

Fermoy is still an interesting town, but will never become a place of commercial importance, as the river is not navigable. The staple trade of the whole country around consists in corn and butter. There is a great extent of nursery-lands near the town, belonging to Mr Baylor. Spenser, who lived in this part of Ireland, has celebrated the barony of Fermoy under the name of Armilla; and of the river Awbeg, the "Mulla" of his fancy, he says,

> "I sat, as was my trade,
> Under the foot of Mole, that mountain hore,
> Keeping my sheep amongst the cooly shade
> Of the green alders, by the *Mulla's* shore."

He lauded the practice of the agriculturists of his time, rude and unskilful as it unquestionably was, with infinitely less propriety than he has celebrated the river Awbeg in many passages of his Faëry Queene. The land rises from the west bank of this river considerably, where the village of Castletown-Roche picturesquely stands, on the road from Fermoy to Doneraile. Here is soil of *prime* quality. The culture is also good. The river Blackwater is, in many of its reaches, extremely beautiful, pre-eminently so between Fermoy and Mallow, and on this account its banks are embellished with the mansions of some of the principal proprietors. Lord Ennismore possesses Convamore, which is one of the most lovely; and Castle Hyde, with its noble woods and plantations. The proprietors of the latter property have long been distinguished as great improvers. Here Scotch husbandry has long since been introduced, and the Devon cow and Suffolk punch have superseded inferior animals; and, among other labours executed on his farm, Colonel Hyde drained a great deal of his clay-land, for although there is much limestone in the valleys of the Blackwater (containing all the fossils of carboniferous limestone), there is in the higher grounds much argillaceous soil.

Doneraile, which has a distant view of the Galtee mountains, is a small, but neat town, belonging to Lord Doneraile, on the Awbeg. His Lordship resides on his estate, and numerous families of great respectability surround him. The soil is good, and the farming correspondent. The late Lord Doneraile was a spirited improver, especially of sheep, and we have no reason to doubt the attention of the present nobleman to the interests of his tenantry and estates.

Mitchelstown, of far less importance than Fermoy, is in the barony of Condons. This town constitutes a part of the estates of the Earl of Kingston, whose noted ancestor, the " White Knight," left an heiress, who had a daughter married to Sir John King, created Baron Kingston by Charles II. The property has been vested in this family ever since. James Lord Kingston founded and munificently endowed (with L.25,000) an asylum for twelve poor gentlemen and eighteen gentlewomen near his own demesne, which is contiguous to the town. In this establishment are sixteen distinct houses, with a chapel in the centre. The late Lord Kingston built a fever hospital. His Lordship also erected a noble house at an enormous expense within his demesne, which consists of 1300 acres.

The celebrated caves near Mitchelstown are in the county of Tipperary. Those discovered within a few years extend from 700 to 800 feet, and have numberless chambers branching off from the main cavern, which, with the stalactites depending from the roof, and their wondrous columns of spar, and transparent folds of drapery, present a most astonishing and magnificent sight.

The straggling village of Kilworth is also in this district, which the limestone soil renders excellent for sheep-feeding and tillage, which is in many instances remarkably good. Cromwell gave the manor of Kilworth to his son-in-law, Fleetwood. It is now the estate of the Earl of Mountcashel, who has in his demesne, Moor Park, 800 acres of wooded land on the banks of the river Funcheon.

Imokilly. The eastern limits of this barony are in a superior condition, but the houses of the peasantry in the parts most remote from the coast are in a very discreditable state. The principal place is Youghal, which exhibits no ordinary decree of comfort and civilization. This town was incorporated in 1209, and now contains 10,000 inhabitants. Some of the streets are remarkably good, and it has an excellent hotel built by the Duke of Devonshire. The bathing strand is so smooth, as to tempt bathers to occupy the lodging-houses around in summer. Education seems to be a paramount object of consideration in this quarter, for the parish, which comprises 9000 acres of light soil, has no fewer than sixty schools within its compass. There are also a public library in the town, established and supported by shareholders of five guineas each, and an annual subscription of half a guinea, and a literary and scientific institution. There are also many of a charitable character. Coasting trade carried on here is considerable, and the manufacture of bricks, pottery, and ropes gives a good deal of domestic occupation.

There are many well wooded seats in the environs, among them the house built and occupied by Sir Walter Raleigh, which is in preservation still. This demesne, Myrtle Grove, is full of ornamental plantations of the bay, the arbutus, and the myrtle, all of which flourish. It was here that the potato was first planted, in Sir Walter's garden. Besides this most interesting seat, which is now occupied by a retired military gentleman, and one belonging to the Duke of Devonshire, to whom the property here belongs, there are several others occupied by gentry.

Much of the agricultural produce of the country surrounding Mitchelstown is sent to Youghal for shipment, and coals are taken back in return. The same remark applies generally with respect to the productions of the soil near Fermoy. Ayrshire cows are the favourites in the neighbourhood of Youghal and Middleton; they have stood the test of nearly twenty years, that period having elapsed since they were introduced by the steward of the Duke of Devonshire to the contiguous county at Lismore. The stock originally imported consisted of twelve cows and a bull, and a fresh infusion of Ayrshire blood has been introduced within the last three years from the same part of Scotland. It is the opinion of Mr Foley, that the Ayrshire breed is well calculated for the south-east of Ireland, and crosses well with the 'old Irish cow,' provided that the latter has not too large a paunch, from deficiency in the length of rib, nor flatness in the fore-rib, which that gentleman considers the characteristic defects in the other stock. He recommends, as a corrective, a dash of Durham blood, in which case the pure Ayr bull may continue his services with good effect. Mr Foley is also disposed to think that the Durham cow bears the wetness of the Irish climate extremely well, which is certainly more favourable in general than that of the south of Scotland, where they constitute the universal stock, but they should have *good* summer pasture. We have understood also, from the same source, that, keeping the in-calf cows of this valuable breed in too high condition, occasioned them to have very small calves, or to drop them prematurely. By not housing his cows until January in the last year, nor feeding high, Mr Foley had large and healthy Durham calves; but as a *general* pasture stock, he wisely recommends the Ayrshire, which are more hardy, and more easily kept.

The town of Middleton, which takes its name from its intermediate position between Youghal and Cork, is at the upper termination of a valley, sheltered by elevated hills, and environed by the well-wooded parks of resident gentry; it has also the vicinity of an inlet of the sea, on the north-east of Cork harbour, and communicates with Cove by the *East ferry*, and might, at an inconsiderable expense, be connected with the inlet which is navigable to Ballincurra, a place within the parish. The rivers Middleton and Avanachora, which surround the town, are celebrated for salmon and trout, and on the Avanachora are flour-mills, malt-works, and a distillery, which latter establishments, it is said, have been paying L.100,000 a-year in duty. Father Mathews will probably occasion in future no small deficit in this particular. Lord Middleton, the proprietor, has not been long dead. Mr Barry of Barry's Lodge, near this place, has a large dairy of Dutch cows, which he prefers to all others. He bestows great care on the breed, and goes frequently to Holland, for the purpose of importing a few young animals to cross with, thus avoiding the degeneracy which would follow from breeding too closely. Nor are his exertions to adopt the Dutch system of dairy management less worthy of imitation. There are also other excellent breeders of Dutch cattle in the same part of the county, namely, the Messrs Coppinger, Adams, and Willan, whose zeal will be stimulated by the laudable emulation to obtain some of the honorary prizes which the Farming Society of Middleton judiciously proposes.

This barony has within its compass other towns, of which the next in rank is probably Castlemartyr, the estate of the Earl of Shannon (the descendant of Richard Boyle, Speaker of the Irish House of Commons), whose fine well-timbered demesne is adjacent. This town, which is on the coach road from Dublin to Cork by Waterford, rose into importance at a very early period from its easy communication with Cork and Youghal, and the fertility of the soil around.

In the southern direction of the same barony are Rostellan, Cloyne, and Millstreet. The neighbourhood of the village of Rostellan is inexpressibly lovely. The Marquess of Thomond has a noble residence here, finely timbered. Near this is Corkbeg, where the owner, Mr Robert Uniacke Fitzgerald, long since practised what may be termed the Norfolk System, for his only differed from the other in the substitution of potatoes for turnips; his rotations being, 1. oats; 2. drilled potatoes, the ground being fallowed well by previous winter ploughing; 3. barley, with clover seeds; 4. clover, used for soiling, and top-dressed after cutting; 5. wheat; 6. drilled potatoes; 7. oats and grass seeds. The town of Cloyne, which was deprived of its Episcopal consequence by the act of the Legislature which sacrificed so many bishopricks, is paltry and irregular. The palace and demesne are now let on a lease. The only manufactures here are those of *hats and brogues.*

Duhallow.—This important section of the county has an area of 100,000 acres, and reaches to the Boggra Mountains on the south; its western line being beautifully skirted for a considerable extent of line by the Blackwater. There is a peculiarity noticed in its geological character, which renders it in this particular distinct from the general nature of the northern division of this vast subdivision of the province of Munster, namely, that though the limestone stratification lies in other parts of the district without any determinate position, accumulated as it were by chance, it is here (in layers of varying degrees of thickness, and irregularly mixed with argillite,) inclined with a uniform and regular obliquity towards the south. On the mountains to the west of Newmarket—a town extremely insignificant, even though it gave birth to John Philpot Curran—there are quarries of limestone. This remarkable aberration from the ordinary dispensation of Nature, who usually limits her bounty in this particular to localities which have not the highland character, has the effect of yielding extraordinary facilities for reclaiming the adjacent mountain bogs, the sloping sides of the limestone elevations, and the plains beneath. The moors are generally improveable, as the peat is shallow, and the argillaceous subsoil easily capable of being drained. The only town besides Newmarket entirely within the barony, is Kanturk, which is undeserving of any remarks. The opening of roads through the country here has been of great utility; among other good effects, it has produced to the inhabitants the comfort of a good fire, either of coal or peat, which are now easily attainable. In the western part there is abundance of turf, which, with a mealy potato, console the poor man whose dwelling is mountainous and lonely. Twenty-five years ago, some of the collieries of this barony were scarcely accessible in wet weather; but the circumstances are far otherwise now, many of the roads having been accurately laid down, and attended to with care, afford all the facilities for conveyance which the proprietors of the coal-beds and the farmers can desire.

"Among the curiosities of this district, is a burying-place at Skeaf, of a round form, in which none but still-born children are laid. They are brought here from great distances, and put into graves, at each end of which a large round stone is placed. There is no trace of any building, nor any other account given, than that the custom is of immemorial standing. Such places, I believe, are uncommon, but I know another instance of a spot set apart for that purpose. The common people are scrupulously regardful of the purity of sacred ground, into which they will not permit any thing unhallowed to be laid. Self-murderers and unbaptized infants are considered to be of this description, and therefore precluded from the common places of interment."*

We cannot close the notice of this portion of the county, without adverting to an extraordinary individual who was a native of it, and of whom we have ourselves heard or known several facts corroborating Mr Townsend's statement.

"What I am about to relate will appear almost incredible, and is certainly very hard to be accounted for, but there is not the least doubt of its truth. Many of the most respectable inhabitants have been witnesses of his performances, some of which came within my own knowledge. He was an awkward ignorant rustic, of the lowest class, of the name of Sullivan, but better known by the appellation "The Whisperer," his occupation horsebreaking. The nickname he acquired from a vulgar notion of his being able to communicate to the animal what he wished by means of a whisper, and the singularity of his method seemed in some degree to justify the attribute. In his own neighbourhood, the notoriety of the fact made it appear less remarkable, but I doubt if any instance of similar subjugating talent is to be found on record. How his art was acquired, or in what it consisted, is likely to remain for ever unknown, as he has lately left the world without divulging it. The wonder of his skill consisted in the celerity of the operation, which was performed in privacy, and without any apparent means of coercion. Every description of horse, or even mule, whether previously broke or unhandled, whatever their peculiar vices or ill habits, might have been submitted without show of resistance to the magical influence of his art, and in the short space of half an hour, became gentle and tractable. The effect, though instantaneously produced, was generally durable; though more submissive to him than to others, they seemed to have acquired a docility unknown before. When sent for to tame a vicious beast, for which he was paid more or less, according to distance, generally two or three guineas, he directed the stable, in which he and the object of the experiment were placed, to be shut, with orders not to open the door until a signal given. After a *tête-à-tête* of about half an hour, during which little or no bustle was heard, the signal was made, and, upon opening the door, the horse appeared lying down, and the man by his side, playing familiarly with him, like a puppy dog. From that time he was found perfectly willing to submit to any discipline, however repugnant to his nature before. I once saw his skill tried on a horse which could never before be brought to stand for a smith to shoe him. The day after Sullivan's half-hour lecture, I went, not without some incredulity, to the smith's shop, with many other curious spectators, where we were eye-witnesses of the complete success of his art. This, too, had been a troop horse, and it was supposed, not without reason, that, after regimental discipline had failed, no other would be found availing. I observed that the animal appeared terrified whenever Sullivan either spoke or looked at him; and how that extraordinary ascendency could have been obtained, it is difficult to conjecture. In common cases this mysterious preparation was unnecessary. He seemed to possess an instinctive power of inspiring awe, the result, perhaps, of a natural intrepidity, in which, I believe, a great part of his art consisted, though the circumstance of the *tête-à-tête* shews that, upon particular occasions, something more must have been added to it. A faculty like this would, in other hands, have made a fortune, and I understand that great offers have been made to him for the exercise of his art abroad. But hunting was his passion. He lived at home, in the style most agreeable to his disposition, and nothing could induce him to quit Duhallow and the foxhounds."

---

* Townsend's Statistical Survey.

All the eastern portion is excellent for grazing purposes and much of it for the plough. This is probably the best wheat district, from the depth of its clay soil, and the contiguity of calcareous manure, which can be applied at little cost, culm being found on the spot. The spade of the labourer not having to enter a gravelly soil, is broader and more English-like than the implement used in more southern parts, and the labourer himself is far better remunerated for his work than elsewhere. Orchards are common, and the Blackwater cider proverbially fine. The farm-houses are good, the wheat crops excellent, and hay abundant.

This clay soil produces fine timber, and hedge-rows, which, however, are more confined to fields and demesnes of the numerous gentry who inhabit Duhallow, than we would wish. Some of the proprietors are remarkable for their long and steady course of improvement. For at least half a century, the families of Wrixon and Freeman at Ballygiblin and Castlecor, have been distinguished as improvers of their respective demesnes, and introducers of the best breeds of cattle and sheep, as well as of every modern improvement. Five and twenty years ago, the late Mr Freeman erected—what was then a novelty—water-wheel machinery, for discharging the water from some of his coal-pits, and worked them with skill and profit. About that period, Mr Townsend had a correspondence with Mr James Grierson of Dalgoner near Dumfries, which led to Mr Townsend's perusal of Professor Jameson's work on the Coal Formation, from which, as he tells us in the second edition of his " Survey," there was no just ground for supposing that the coal-veins in this county would be very productive, except in the barony of Duhallow. Experience has proved the correctness of the Professor's opinion; for it appears, from a recent report of the Railway Commissioners of Ireland, that this barony contains the thickest and most valuable coal-beds of the Munster district. The collieries are now in extensive work at Dromagh and Gurteen, and no doubt is entertained of the capability of the whole of the south portion of the Munster coal district to supply an abundance of culm for centuries to come. The town of Mallow, though partly in the barony of Fermoy, may be here considered as an appendage to Duhallow. Situated in the vale of the Blackwater, sheltered and richly wooded, this town, so long famous for its mineral waters, which resemble those of Bristol, though surrounded by a wealthy proprietory, has only recently been supplied with a decent spa-house, yet, with a deficiency in this particular, incommodious lodgings, and no very pleasurable excitements of any kind, Mallow has attracted the consumptive sufferer who seeks health and quietness. Sir C. D. O. Jephson Norreys, the Lord of the Manor, has a demesne close to the town, and freely opens his well-kept walks to the public, who possessed the same unrestricted privilege from Mr Jephson, the near relative and predecessor of the Baronet, to whom the property has devolved. This liberality is worthy of general imitation: it tends to connect in friendly bonds the "people" with the "lords of the creation," and civilizes the most rude. We hate to see such notices as these ostentatiously and ill-naturedly attached to a gate, or perhaps a fine old tree, which would otherwise woo the traveller to its shade,—"Any person entering these grounds will be prosecuted with the utmost severity;" "No strangers admitted;" "Man-traps and spring-guns." When generous confidence is reposed in the public, a little mild vigilance observed, on the part of the owner, of a fine or romantic pleasure ground, will prevent any serious injury to shrubs, flowers, walks, or favourite animals. And if a caution be required, it is surely prudent to express it in the least offensive terms. We will adduce an illustration: When the walks and grass lawns of St James's Park in London were thrown open twelve years ago to the public without reserve, placards (which still remain) were posted up in the following words: "The Commissioners of her Majesty's Woods and Forests, &c. earnestly request that all persons frequenting this garden will endeavour to protect the valuable collection of aquatic birds."

Now the plain construction of this polite notification is, "Boys, don't throw stones at the ducks and geese;" but the hint is so delicately and kindly worded, as to disarm even the wildest schoolboy of his instinctive desire to fling stones, when, with a surly notice before his eyes, he would be disposed to take every opportunity of annoying the guardians of the place by perpetrating the prohibited deed. Young, in his Tour, has designated the demesne at Mallow as a *ferme ornée*; it is neat and well kept, and divided regularly by luxuriant hedge-rows. Within the circuit of a few miles around the town, are the rich and well cultivated demesnes of Dromore, Rockforest, Bearforest, and many of lesser extent, but possessing elegance and comfort.

On a former occasion, we gave a short description of the village built by the Crown at King Williamstown, on the tract of red bog called Pobble O'Keefe. Much of this moor is in the barony under observation, the remainder in Kerry. Two great lines of road intersect this model-village farm, the one

33½ miles in length, connects Tralee with Cork, passing by coal-beds; the other 10 miles long, leads from Killarney to Mallow. There are now 100 acres of the bog brought into experimental cultivation, and a great deal more drained for pasturage. Limestone quarries are very near it, and other roads will no doubt be formed to render them accessible to the whole bog country surrounding. It is said that only 5000 acres are as yet in the actual possession of the Crown.

Orrery and Kilmore.—These two baronies are very similar in their general circumstances, except that the soil of the one is not calcareous, though that of the other is highly so. Much of Kilmore possesses a stiff clay like part of Duhallow, but it is not too remote in any point from limestone. The northern part of the union joining county Limerick,—such, we have made for the sake of brevity—has abundance of limestone gravel. The southern (Orrery) bounded on the east by the barony of Fermoy, yields calcareous gravel in abundance, and has every variety of soil. With such qualities, tillage and grazing are highly productive; the dry upland is of admirable quality for sheep; the lowland for heavy cattle. Butter and beef here are the staple productions, and Durham cows and Leicester sheep the ordinary stock. There are many dairy-farms. Charleville, at the extreme northern extremity of the county, is the principal, if not the only, town in the union. It owes its origin to Roger, the first Earl Orrery and President of Munster, who named it after Charles II. It is on the road from Cork to Limerick. The plantations of Saunder's Park are the most pleasing of the surrounding objects, though many proprietors of high rank and consequence have property adjoining to the town.

Buttevant is a village or small town now of little note. It was a considerable military post, and of course, a scene of some bustle and petty trade. It is still a good market-place for pigs and potatoes, and employs a good many hands in a large flour-mill.

There is a very defective practice not confined to these baronies, of taking two crops of potatoes in succession from lea, and then two or three crops of grain, laying down the land with the concluding crop of oats in a most filthy state. The proper course of alternating the crops is obvious; but besides the folly of expending the manure intended to benefit five crops, upon the two first, the practitioners, in the first instance, too frequently allow the manure "to waste its sweetness on the desert air," their custom being, to cart it out on the (unploughed) sod, and leave it there bleaching in the sun, or drying under a sharp east wind for weeks before. The little farmer or cottar has time to lay it evenly, place the cut sets of potatoes upon it, and cover it from the furrows with his spade. In the following year, the ground being ploughed into ridges five feet wide, the dung is also spread over the surface, (the seed having been previously "stuck" into the land with a narrow spade), and often left so until the essences have evaporated. The first crop of corn is usually good; it need not be said that the next is or are (for a third is sometimes forced) bad or very bad, nor is there ever a good crop of clover from a sowing under such desperate circumstances. Paring and burning is still practised on land peculiarly unfit for it.

Muskerry and Barretts.—These baronies are extremely irregular and interlaced; the river Lee meanders through both. Muskerry (pronounced Muskry) is the largest barony excepting Carbery, and like that into east and west sub-denominations, of which the latter borders on Kerry. This part is stony where it is not boggy, and though very mountainous, without any objects of real sublimity and grandeur. There is a lake, however, of some beauty though of a gloomy kind, or more correctly, there are two lakes in Muskerry. One of these is called the Lake of Grugane Barra,—so named from St Finbar, one of the *raal ould* saints of Ireland, and the same religionist who founded the cathedral dedicated to him in Cork. He made the margin of this lake his retreat, and it is still a spot of reverential consideration to the Roman Catholic devotee. Smith, in his History of Cork, says, that this lake covers 200 acres. Mr Townsend makes it but a small fraction of this extent, while, on the contrary, the compilers of Lewis's Dictionary estimate the area at 800 acres: but it must have been intended to describe Inchigeela (or Lua) Lake into which the other flows. Inchigeela, according to some estimates, is five miles and a half in length, while others diminish it to three. In the olden time, with its sylvan decoration, it must have been beautiful; but every tree has been long since removed, and the bare bleak sides of the lake are very cheerless. The river Lee, originally a spring feeding Grugane Barra, flows forth in a copious stream from the second lake, and discharges itself, after a long and winding course, in the harbour of Cork. The new road from Cork to Bantry passes along the whole of the western side, and near the upper extremity is continued through the pass of Keminea, a chasm one mile in length between the dissevered rocks, in the fissures of which the arbutus and the holly have taken root and flourish.

Macroom is the chief town in Muskerry. It consists of one long street, and is improving a *little* in its appearance. The principal business here consists in buying corn and pigs. The parish of Macroom contains nearly 11,000 acres, four-fifths of which are in tillage; the rest is rough and merely pastoral. Robert Hedges Eyre, Esq. one of the largest proprietors in Ireland, lives at Macroom in the castle, and spends his noble fortune at home.

Millstreet is a poor village in the same division. The east and west sides of the Blackwater, which runs through it, belong respectively to Henry Wallis and M'Carthy O'Leary, Esquires. The parish of Drishane, in which the town stands, and which extends into the county of Kerry, comprises 32,000 acres, of which a very small part is fertile or arable, the remainder is mountainous and wild. The farms are generally large, but though there are some good farmers near Millstreet, the majority are otherwise. There is much butter made here.

Ballincollig, with its sixteen gunpowder-mills and military establishment, is in the barony of Barretts. The manufacture of gunpowder does not come within the practice of the farmer, and the town itself is not worth even a passing remark. The entire of the peasantry in this barony (and the same may be said of the county at large) subsist upon potatoes; they do not even relish oaten-bread or porridge, they complain that it sickens them. While potatoes continue to be their sole article of food, it is vain to expect a sufficiency of manure for general farm purposes. The insufficiency of manure must always prove a radical impediment to real improvement. A friend of ours, three years ago, on taking the management of 100 acres of tillage in this county, and near a considerable town, found that the previous system had been to purchase town-manure, which, carriage inclusive, cost annually L.150, or 30s. an acre, being more than the value of the land. He at once commenced the four-shift rotation, and he is now, in consequence, enabled to manure one-fourth of the tillage-land, besides top-dressing, for such it proves, by feeding sheep on rape and turnip tops, all the meadow-land required to supply an extensive establishment with hay. He also house-feeds sheep to a considerable extent. Nor is this all; this truly valuable individual has suggested an approximation to that system of regulated husbandry for tenantry, which is of so universal application in Great Britain, by compelling every tenant to sign a document to the following effect: "I hereby agree to adopt and adhere to such a system of rotation of cropping as ——— by his agent or steward for the time being shall direct; and also engage that I will not, in any instance, grow what are termed two white crops in succession, without being subject to forfeit to ——— the second of said white crops, and to pay a double amount of rent for the year in which such second white crop shall have been grown, should ——— by his agent or steward as aforesaid think proper so to order it." At first this appeared harsh, but the tenantry on this property, now understanding its expediency, have no hesitation in adopting the condition, knowing, independently of the penalty, that it is their own interest to adhere strictly to it. On the same estate, the manner of compensating an outgoing tenant is, to allow him two-thirds of the crop of all land *manured* in the *previous* year (seed and labour having been furnished by him), subject to the year's rent of the current year, leaving to the landlord, or incoming tenant, whichever is in possession, the other third for taxes and rates otherwise incident on the same; or, if the incoming tenant prefer supplying seed and labour, and being subject to the rent of said manured land, he is allowed two-thirds of the crop, giving to the outgoing tenant the remaining third as compensation for his previous year's manure. Some landlords adopt, in preference, this arrangement; the incoming pays to the outgoing tenant half the annual rent to which the latter had been subject, on his giving up all farther claims. Sometimes the arrangement is left to the arbitration of some intelligent and honest neighbours, who generally arrange matters amicably; but if, on a division, the numbers be equal, the steward gives his casting-vote to the best of his judgment, and Paddy, who can be easily reconciled to justice if he sees it impartially administered, is usually satisfied with the decision. Our friend takes into account, whether the advantage derivable from the manuring be of a permanent nature (as from lime or marl) or evanescent; in the former case, he makes the landlord bear an equitable proportion of the charges.

Who has not heard of the groves of Blarney? Who has not been blarneyed more or less? The town of Blarney, and its castle, and Mr Jefferys—we are tired of Esquiring the real gentry, who need it not—must have a page or two of this closing article. The castle is on a rock, in a commanding and beautiful position. "The interest which both natives and strangers take in the castle, arises more from a tradition connected with a stone in its north-eastern angle, about 20 feet from the top, than from any other circumstance. This stone, which bears an inscription in Latin, regarding the erection of the fortress, is called the Blarney Stone, and has given rise to the well known phrase of Blarney, in reference to a notion that, if any one kisses it, he will ever after have a cajoling tongue, and the art of flattery, or of telling lies with unblushing effrontery. Few, however, venture upon this ceremony, from the danger in being lowered down to the stone by a rope from an insecure battlement 132 feet high. The groves of Blarney are of considerable extent, and very interesting; and beneath the castle are some spacious natural caves, one of which was converted into a dungeon by some of its early proprietors; it is entered by a very strong door, near which is a solitary window, scarcely admitting a ray of light, and there are several other massive iron rings and bolts yet remaining. Stalactites and stalagmites of beautiful formation, and very compact, are found in these caves."* Young's Tour gives many details of James St John Jefferys in his own day, a munificent and enterprising gentleman, whose taste has rendered the castle so exquisitely fine. His successor continued to plant and improve with the same ardour, and woods and shrubberies now amply attest the creating care which formed them. Dripsey, the property and residence of Sir Nicholas Colthurst, is another place of deserved admiration, though of far lesser degree, in the same quarter.

---

* Lewis' Topographical Dictionary.

Having, under the head of each Barony, already touched upon any distinguishing feature in the course of local husbandry, nothing remains to be added on this subject. We shall merely make a statistical remark on that most important of the grain produce—wheat—and the introduction of bone-dust into this county. The deficiency in the grain crops throughout the county during the two last years, compared with 1837, has been very considerable. The calculation has been made on the supposition, that two-thirds of the corn of the entire county was delivered in the city of Cork; and the periods of sale have been the last four months of each of those years. If the hypothesis be correct, the result is as follows, the prices being rated at 1s. 6d. per stone for wheat, and 1s. for barley and oats.

Loss in deficiency of wheat in 1838 compared with 1837,		L.31,434	13	4
Ditto	barley	20,162	18	8
Ditto	oats	53,801	1	4
		L.105,398	13	4
Loss in wheat 1839 compared with 1837,		L.41,853	6	8
Ditto	barley	43,700	11	6
Ditto	oats	3,263	18	2
		L.88,817	16	4

Mr Edward Carroll, an experienced agriculturist in that county, and a valuable contributor to the pages of the Irish Farmer's Magazine, is of opinion, that the deficiency in produce, though mainly attributable to atmospheric causes, over which man has no control, arises in part, and indirectly, from not changing the periods of sowing, according to the state of the soil and the weather; he advocates autumn and spring instead of winter sowing, after the removal of the potato crop.

It is gratifying to know that a bone-crushing establishment is in active operation in the city, through the energetic industry of Mr Deeble, who has also, for some time, conducted the preparation of kelp for manure. The value of bone-dust on the light dry soils of the county, if applied to turnip husbandry, may become considerable. Those only, like Mr Carroll, who have made themselves practically acquainted with the results of the application of those manures, on such a dry light soil as that of the greater part of this vast county, can justly estimate its value.

The corn-market of the city of Cork is managed by a body composed of merchants and country gentlemen, representing their respective interests, and as far as the influence of these trustees, as they may be denominated, extends, there is no room for complaint; but there is a counteracting power, arising from a combination understood to exist between the corn-merchants, millers, brewers, maltsters, and distillers, on the one side, and a class of men who are termed brokers, on the other. These persons, who infest the markets, and receive fees from those concerned in the buying of corn, arrogate to themselves the right of selling all the corn which is brought into the market, and so successfully do they conduct their proceedings, that the buyers generally decline to make purchases except through their agency. The following instance may be relied upon as authentic. A shrewd and intelligent farmer, of recent establishment in the county, had occasion to take some barley to the corn-market, two or three years ago, and was determined to sell it himself without the instrumentality of the brokers, but he found that no buyer would speak with him about the sale of it, and was obliged, after a day of fruitless labour, to surrender the sale into the hands of the brokers, who, during five successive days of the sales of the corn, which was of the same quality throughout, gradually lowered the price each day after the first, on which only they gave a fair price, first reducing the amount by 6d. per barrel of 16 stone, then regularly deducting each succeeding day 6d. more than on the preceding one, so that, on the fifth day, 2s. was the reduction which these intermediate agents thought fit to make. The same system of injurious agency operates in the cattle-market, the result of which is, that, notwithstanding the high prices of beef and mutton in the meat-market, which would naturally tempt the farmer to fatten cattle, he is deterred by the difficulty of effecting profitable sales. If a prime lot be offered for sale, and not sold to the first bidder, no other person, it is said, will offer for them during that day any sum near the first offer; nor will the first bidder offer as much on the second day as he did on the first, so that ultimately, after harassing the cattle by driving them to and from the market, and causing expense to the owners in proportion to the distance from market, the brokers contrive to have the disposal of the cattle on their own terms, unless the owners can manage to have them slaughtered on their own account. This latter evil, however, is being remedied by the appointment of a commission agency, effected by the Messrs Adams of Liverpool, to whom stock can henceforth be forwarded from the Cork establishment. They, of course, as in all commission cases, remit the proceeds of the sale after the ordinary deduction, and also advance some money in Cork on the delivery of the stock to their manager there. It is much to be hoped that this undertaking will succeed, and the character for integrity and correctness hitherto maintained by the Messrs Adams, is a reasonable ground for the anticipation of success. The pig-market shares more or less in the evils of the broker system with the cattle-market, with an additional one, from which the latter is exempt;—the practice of examining, *by professional men!* the tongue of every pig sold at market, lest the animal should be affected with measles. The examination is conducted as follows: The operator, who has always a powerful combination of muscles, takes hold of the unfortunate pig by the fore and hind legs on the same side, and by a sudden, and sometimes fatally violent jerk, throws it from the centre of gravity. When the victim of this brutal treatment is flat on his side, the mock doctor fixes one of his knees on his head, close to the ear, and with a short stick, which he calls a clialpeen, he wrenches the mouth wide open, and keeps it so by means of the same stick, which acts as a lever, sustained by the force of his other foot pressed on its lower extremity on the ground. While the sufferer is kept in this state of extreme uneasiness, and in danger of having his jaw dislocated, the amiable operator pulls out the tongue to the utmost stretch, in search of measles underneath.

If he reports the reality of the apprehended disease, whether truly or not, the seller is subject to a reduction of from 4s. to 8s. per cwt. in the price of the animal; and there is sufficient reason to believe that those doctors, though sworn to give true judgment, sometimes favour the Irish buyers, by pronouncing that disease exists, where there is no just ground for the assertion; and, on the other hand, if privately and discreetly presented by the seller with a shilling or two, will assert that a measley pig is free from disease. The present cattle and pig markets are a disgrace to the city of Cork, or to any town having any pretensions to civilization. It is much to be desired that the municipal authorities will, as soon as possible, remove what are now nuisances, and endeavour to establish unobjectionable market establishments near the corn, hay, and straw market, where ground appears to be available for the purpose.

THOUGHTS ON THE IMPROVEMENT OF SEED-WHEAT.

By Mr John Russell, Beanston, East Lothian.

The history of rural affairs during the last century, presents nothing more remarkable than the great amount of improvement which has taken place in the breeds of domestic animals; and nothing can afford to our minds a better illustration of the control which man, by care and perseverance, is capable of exercising over the productions of nature. Now, it is well known, that the laws which nature employs in the animal kingdom are similar to those which govern the vegetable one; and a knowledge of this circumstance ought to convince us, that the hereditary qualities of seed (if the expression may be allowed) are capable of the same progressive changes which, we know from experience, have taken place in the animal kingdom. If so, then, to what extent have we availed ourselves of this circumstance? In some plants, of secondary importance, and of comparatively recent introduction, we can indeed trace a progressive improvement, sufficient to confirm the analogy here pointed out, and to justify the inference deduced from it. But, with respect to wheat, which holds the first place both in point of antiquity and importance, the changes which have taken place certainly have not been those of progression. This I conceive to be a legitimate inference from the fact, that the variety of wheat, which was the result of accidental discovery about fifty years ago, and which has not since been subjected to any system of judicious improvement, is still esteemed the most valuable variety by the greater number of practical men in this part of the country.

Now, if we are warranted in entertaining the opinion, that seeds are capable of a great degree of progressive improvement and amelioration, the causes why the history of wheat presents so few facts in accordance with that opinion, demand a serious investigation.

These causes, I apprehend, are to be attributed not so much to the want of attention to the subject, as to its injudicious application. For every year brings us some new variety of wheat, and those in existence at the present day are almost innumerable; all of which have, at no remote period, been raised from a single grain, with the most patient industry and attention. If, then, we have so many varieties, and no lack of care devoted to the discovery of more, how does it happen, that not one individual variety possesses qualities capable of securing to it an undoubted pre-eminence over the rest? The reason, I apprehend, is because too much attention is given to the discovery of new varieties, and too little to the improvement of existing ones. Our improvers of seed seem disposed to rest their claims to public attention upon merits peculiarly their own, and set small value upon the labours of their predecessors. Nothing short of a new variety will satisfy them; and, in order to obtain this, they proceed to a field of wheat, select an ear remarkable for some valuable property, real or imaginary, and upon it they bestow all their care and attention. They carefully deposit its grains in the soil, and, by-and-bye, it affords them gratification to observe the vigour with which the plants withstand the inclemency of the winter, or shoot up to early maturity in the summer, probably upon the rich soil and within the sheltered precincts of the garden. The produce they again sow, and still cherish, with paternal care, the hopeful generation destined, as they suppose, at no distant day, to bear their name through the length and breadth of the land. But what is the result of all this care and attention? They may, indeed, succeed in obtaining a distinct variety of wheat; but, instead of its becoming generally acceptable, and rewarding the care and attention bestowed, the probability is, that, in every valuable quality, it falls infinitely short of the varieties previously known. It would not be difficult to give a long list of what may be termed obsolete varieties of wheat, which claimed for a while the attention of the public, but, possessing no valuable qualities of their own, gradually sunk into oblivion.

Nor is the result to be wondered at; for the method of proceeding is directly at variance with the plans of nature. It is despising those slow and gradual steps and that continuity of plan, carried forward from one generation to another, which have effected such great improvements in other departments of human knowledge, and by which alone our exertions can be crowned with great and successful results. It is, in fact, imitating the conduct of those enthusiastic men of science in the middle ages, who dived into all the mysteries of alchemy, and spent their lives in the patient investigation of nature, influenced by the vain hope that fortune one day would reward their labours with the accidental discovery of the philosopher's stone or the universal specific.

Since, therefore, the system of accidental discovery has only had the effect of filling the world with an endless number of useless varieties, let us confine our attention to an undertaking more likely to be rewarded with practical benefit. Let us, in short, endeavour to improve some of the existing varieties. In this undertaking, experience can be of little service to us, because we have seen that our labours have hitherto been injudiciously applied. But, fortunately, there is no branch of human knowledge, however little known, which is not connected, by certain laws and analogies, with some other branch, better understood; so that our knowledge of the latter, in no small degree, serves as a guide in our inquiries into the former. In the great chain of nature's works, there is nothing more remarkable than these analogies; and, by means of them, a careful and observant person can connect objects of apparently contrary natures by points of striking similarity and resemblance. It is not my intention at present, if it were in my power, to exhibit all the analogies which exist between the animal and vegetable kingdoms. A few of them must present themselves to every one's mind. The broad leaves of a plant are as essential to its receiving nourishment and support from the air, as the extended surface of the lungs is necessary to the existence of an animal. The food of plants is prepared by a process similar to that which takes place in the animal stomach; and the roots perform an office very analogous to that of the lacteals of our system. The seed by which some species of trees are propagated, affords no inept representation of a bird's egg. The ostrich deposits her egg in the sand, and the oak drops its acorn upon the soil: both the bird and the tree are raised into life by the vivifying influence of the sun's heat, although the former is classed amongst animals, while to the latter we assign a place in the vegetable kingdom. The lambkin, that basks upon the sunny bank or "lurks in safe shelter from the winds of March," and the tiny plant, expanding its leafy bosom to the influence of day, and again shrinking at the approach of night, exhibit proofs of kindred life.

But the most striking feature of resemblance betwixt the two kingdoms is the fact of the existence of sexes, and of the habit of sexual intercourse, being common to both. Now, if an improver of seeds were desirous of profiting by this circumstance, it would immediately occur to him, that they are capable of a great degree of progressive improvement and amelioration, with a soil and climate adapted to their cultivation, and that those changes which they are continually undergoing, either towards improvement or deterioration, are, in a great measure, dependent upon this sexual habit. Under this view of the matter, an improver's chief object will be to avail himself of that habit, so as to render the changes which take place those of progressive improvement and amelioration. This is what the skilful breeder of stock always has in view; and his conduct the improver of seeds ought to imitate, subject to such modifications only as the difference between animal and vegetable life requires. Thus, for example, like the breeder of cattle, he will always expect like to produce its like; but he cannot, in imitation of him, from two individuals possessing prominent and opposite defects, extract one which shall make much nearer approaches to perfection. It is doubtful whether or not he may be able to produce a particular combination with advantage; and it is certain he cannot calculate, *a priori*, what shall be the result of such combination: the laws which govern vegetable life are too minute and intricate, in the present state of our knowledge, for his wisely regulating the changes which take place in it. But Nature herself is continually making experiments for him: she is profuse of variety, and every year she spreads an ample field for the exercise of his judgment and discrimination. Out of that profusion, it is in his power to make a skilful selection; and, by doing so, he will exercise a beneficial control over the produce of the following year. Let the cultivator, therefore, at harvest make a numerous selection of ears of wheat for seed, remarkable for a combination of valuable properties. From the produce of these, let another selection take place; and so on for a series of years, always taking care to make the selection so numerous as to ensure the maintenance of the valuable properties of the original variety. By following this method, he is sure of arriving at a successful result; because he will then be acting in concert with the laws of nature, and taking for his guide the experience of the breeder of stock, which, as we have seen, ought to be available to the successful prosecution of his undertaking.

ON THE EFFECTS PRODUCED BY THE CHEMICAL NATURE OF THE SOIL AND SUBSOIL UPON CULTIVATED CROPS.

By Henry R. Madden, Esq., M.D., Penicuik.

Under this title I propose to treat of some of those effects which are presented to our view, when examining the various degrees of fertility exhibited by different parts of the same district, and which cannot be explained by any reference to diversity of exposure, climate, or cultivation, and which, consequently we are led to conclude must be produced by some difference in the nature and properties of the soil, affecting either the crops themselves, the manures applied to the land, or probably both conjointly.

There are two methods in which this subject might be advantageously illustrated, 1st, By shewing the different effects produced by the same manure upon soils varying in texture, upon which subject a great deal of information has been already obtained, and many valuable treatises published, but which is nevertheless still open to careful and minute inquiries. 2d, By shewing the different results obtained by the same cultivation upon soils of similar texture, but, having a different geological origin ; it is to this point in particular that I wish at present to direct the attention of my readers. Before detailing the example which I am desirous of bringing forward, it will be advisable to make a few general observations upon the mode of conducting such inquiries ; and I may here observe that one object, and it is of considerable importance, of my publishing the account at present, is for the purpose of inducing others to make similar investigations, for I am willing to confess that I do not consider the subject by any means exhausted, and consequently may very possibly return to its consideration at some future period.

In pursuing an examination of this kind, the following considerations must be particularly taken into account. 1st, It is of the greatest importance, that precisely the same method of cultivation be adopted upon both the spots examined ; in fact, if it is possible to get both examples upon the same farm the result will be more trust-worthy, because, as we seldom see two farmers who pursue precisely the same mode of culture, so likewise we continually meet with considerable differences in the product of the same species of soil, in the same climate and elevation. In fact, if this were not the case, if the same soil would, when cropped with the same rotation, always produce equal crops, both as to quantity and quality, the terms *good* and *bad*, as applied to farmers, must be devoid of meaning. 2dly, Both portions of soil must be under similar circumstances in regard to the length of time in which they have been cultivated, as it would obviously be unjust to ascribe to the chemical nature of the land any differences observed in soils of the same texture, if part was newly brought under cultivation, and the remainder either brought to its highest state of perfection by many years of good tilling; or, on the other hand, completely exhausted by the constant repetition of severe and scourging rotations, or the baneful influence of a bad system of farming. 3dly, It will of course be necessary to ascertain that both portions are alike in relation to water, that is to say, either both must be drained, or neither, for nothing could be more absurd than to compare drained with undrained soil, under any circumstances; and, lastly, in a case of this kind we should never trust to an opinion founded upon observations made in one year only, as there are so many collateral circumstances which tend to produce variations in the crop, that judgments formed in so short a time would be extremely liable to error. In the case which I am about to bring forward, I trust all these circumstances have been guarded against; both the kinds of soils being upon the same farm in some spots, and the same varieties occurring in several situations, and the results being borne testimony to by all the farmers connected with the part of the country to which I refer. I shall at once, therefore, proceed to describe the case, and explain the conclusions at which I have been able to arrive, from a careful consideration of all the well authenticated information which I have received from various farmers in the district.

All those who are conversant with the geology of Mid-Lothian, must be well aware that the coal-formation comes in contact with various traps, especially compact felspar, claystone, and porphyry, at the south of the Pentland Hills. The junction of the two formations occurs close to the foot of the hills in most places, although, in a few spots, the trap stretches a short way into the more level ground which lies in the immediate neighbourhood. Now, the fact to which I wish to call the attention of my readers, is, that all the farmers in the district, have found a very evident difference in the fertility of the soil, according to its position, namely, whether lying above the trap, or the coal-formation; and all are agreed in considering those portions connected with the trap-rocks as by far the most fertile. Two or three of the farms are partly upon the coal and partly upon the trap, in which cases, the farmer invariably gives preference to the latter portions, except, indeed, when he has very highly cultivated loam upon the coal,—in which case, of course, it would not be fair to make the comparison with that occurring on the trap, as the latter is, for the most part, hillside soil. This is the case upon the farm of Braidwood, where all the parts lying to the north of the Biggar road is upon the trap, while the majority lying south of the road, is associated with the coal-formation. I have obtained the following very interesting information from the present tenant Mr James Maclean. Where the soil is associated with the trap-rocks, he finds that his crops are always *much more certain* than on any other part of his farm. That, although a much lighter soil, he only gives it the same quantity of manure as the other parts of his farm, and still the crops are equal to any he has, except what are produced by his finest loam; and this occurs constantly, although the land is so much inclined, that, by the rain and the various operations of ploughing, &c., the soil shifts to such a degree, that, at the end of every rotation of six or seven years, he has to cart from thirty to forty cubic yards per acre, from the bottom of the field to the top, in order to keep the soil of the same thickness throughout. Now, it appears to me, that we could not have more conclusive evidence of its superiority than the foregoing statements, because, in the first place, we find that, notwithstanding the part referred to being the most elevated portion of the farm, still the crops are *much more certain* than those upon the lower and more level parts; and again, we find no excess of manure required although the soil is *much lighter*, so that, if compared with soil of the *same texture*, it would of course be found to require *less*, as it is well known that the lighter the soil is, the more manure it requires, as it stands to reason, that if the texture be such as to facilitate the action of air and moisture, and thus increase the rapidity of decomposition, it must of necessity require a larger quantity of manure to produce a given effect for a given length of time, than would be necessary were the soil of a nature to retard the putrefaction of the organic matter; hence the origin of the phrase of such a soil being a *hungry* one.

Let us now take a summary view of the case as it stands.

We have two portions of soil occurring upon the same farm, one of which is of a much *lighter* texture than the other, and still *superior* in quality when enriched with the *same* quantity of manure. It comes, therefore, to be of great importance to discover to what this increased fertility is owing. Is the superiority owing to the organic or the mineral constituents of the soil ? That it is *not* owing to the *organic* constituents, is proved by the following considerations, namely, 1*st*, that where both kinds of soil occurs upon the same farm, we must of necessity conclude that they have received precisely the same culture, and, consequently, as the soil has been long under tillage, the organic matter of both must long ere this have assumed the same character all over the farm, in so far as it is *not* affected by the mineral matter; 2*d*, as the same varieties occur through the whole line of country for some considerable distance, and embrace portions of various farms, and, consequently, must be subjected to considerable diversities of cultivation, and hence likewise must contain equally numerous varieties of organic matter, the same superiority could not by possibility exist in all situations, if it were not owing to some peculiarity of the *mineral* or *fixed* constituents. Let us endeavour, therefore, to discover what this peculiarity is ; and, before proceeding to lay down any suggestions, I may observe generally, that the subject is of much greater difficulty than one would at first imagine, especially to a person unacquainted with chemistry. Such persons are extremely apt to suppose that the science of chemistry can do every thing, that we have only to take a substance, no matter what it may be, and introduce it within the magic circle of a *laboratory*, and, at our bidding, it will resolve itself into its primitive parts, and inform us as distinctly as if gifted with the power of speech, not only of its mode of formation, but of every other particular with which we are desirous of becoming acquainted. That such is not the case, is, alas, too true, and that this remark is peculiarly applicable to soil, I may confidently assert. For instance, to give an example of one of the insurmountable difficulties which are constantly presented to us, I may mention, that one of the constituents of soil may be derived from three different sources, and it is often of the greatest consequence that the agricultural chemist should be capable of determining from which of these it has been derived; but how to do this is a perfect enigma. In the case in question, I have hitherto confined my investigations to the different geological origin of the two soils, not only because this is the cause to which the difference of fertility is uniformly ascribed by the farmers themselves, but likewise because it is by far the least difficult. 1*st*, we have abundant proof that the soil upon the trap has been produced "*in situ*" by the disintegration of the rocks in the immediate neighbourhood; in fact, the production of soil is still proceeding from the weathering of the rocks where they are exposed, and from the breaking down of the stones (derived from these rocks) which occur in abundance throughout the soil.

2*d*, The origin of the alluvium, associated with the coal-formation, is much more obscure, for as the soil is in both instances the same in its constitution, namely, a mixture of sand and clay (which is in fact the case with all soils), it might be supposed that the soil in the valley originated from the decomposition of the Pentland trap, and had been deposited above the strata of the coal-formation through the agency of water, in which case, the argument as to the difference in fertility depending upon difference in geological origin would, of course, fall to the ground. I am happy to say, however, that we are not left in doubt upon the subject, but possess most satisfactory proof, that both the alluvium and diluvium, connected with the coal-formation, has come from the west and not from the north, as would be the case were any part of it derived from the traps of the Pentland Hills. This is manifest by the direction of the strata of sand, clay, and gravel wherever they are exposed by sections either natural or artificial, for, in all, they slope from west to east, and is still further proved by the fact of the boulders and pebbles being composed of greenstone and sandstone, the former of which does not occur on this side of the Pentlands, except in the neighbourhood of Loganhouse burn, from which it could not have been derived, and the latter of course belongs to the coal-formation itself. We are therefore, I think, fairly authorised to conclude, that the geological origin of the two soils are quite distinct.

Let us now see to what extent chemistry can assist us in explaining the difference in fertility. For this purpose, I have examined the stones which occur dispersed throughout the soil, and which, as I have already observed, consist of compact felspar, claystone, and felspar porphyry, together with a species of conglomerate formed of splintered felspar, cemented together by veins of quartz and calcareous spar. To this conglomerate and the compact felspar, I think, we must trace the increase of fertility. In reference to the conglomerate, I find that it is undergoing decomposition with great rapidity, and, in this manner, the stones lying on the field become covered with an impalpable powder of a reddish colour, which is very greasy to the touch, and is evidently what may be termed a fat marl. According to my analysis, it contains, in addition to alumina, silica, and a small quantity of oxide of iron, carbonate of lime, to the extent of about 5 per cent. and sulphate of lime. As it is derived from the disintegration of felspar, it will contain also one of the alkalies, either potass or soda. I have proved the non-existence of potass in any appreciable quantity, and we may hence conclude that the alkali in this case is, chiefly at least, soda. That this substance contains all the ingredients necessary to fertility, is evident, and, moreover, it is a curious fact, that my analysis corresponds in many respects to Gerar's published analysis of Nilotic mud, whose fertilizing properties are too well known to require any detailed description. Now, as the rocks in Egypt abound in granite and porphyry, it comes to be a very interesting question, whether our most fertile soils are not for the most part derived from the disintegration of felspar. It would, however, require extended and very careful investigation before we should have any right to draw such a conclusion; and I merely throw out the hint in this place, in order to put persons on their guard, and induce them, when opportunity offers, to ascertain, if possible, the geological origin of any peculiarly fertile soil which may come under their notice. There are several interesting observations which have yet to be made in reference to the two kinds of soil in this neighbourhood, such as their capacity for heat and moisture, which I shall make as soon as opportunity offers, and, in the event of their being attended with any interesting result, I shall lose no time in communicating them.

ON THE CANKER IN THE LARCH.

By Mr Alexander Drummond, Surveyor, Perth.

There being a considerable extent of wood on some properties I am professionally connected with, my attention was directed to the larch, which I found to be in a very diseased state. In certain localities, large masses of wood were either dead or dying; and it is remarkable that the disease appears to attack weak and vigorous trees indiscriminately, indeed the most thriving seem to be most liable to its influence.

From a pretty extensive course of observation, I have formed the opinion, which I shall now endeavour to illustrate, that the cause of the disease is an ungenial atmosphere. This it is which produces those ulcers in the bark called "the canker." In the first stage, or latent state of the disease, it may be observed on removing the bark, that there are small spots in a diseased state, and if the tree is otherwise healthy, and the foliage luxuriant, the sap-vessels of the part affected will be found to be charged with inert morbid rosin. At a more advanced stage, the disease may be detected by a slight discoloration of the outer rind, or by the rosin exuding through the bark, and (in corroboration of the theory that the fluids ascend through the sap-wood, and descend through the bark) the exudation takes place immediately above the diseased part. The bark then *blisters* and dies when the existence of the disease becomes distinctly visible. If it is very virulent, it extends till it encircles the small stems or branches, the circulation of the sap is then stopped, and vegetation above it ceases. In this way it attacks and kills branch by branch of the large trees, until they are all destroyed. But if the disease is not so virulent, it does not encircle the stem, and in this case the fluids still flow through the fresh part of the bark, and if the tree is in other respects healthy, it continues to grow even vigorously. In some plantations the disease may be seen on the main stem of individual trees, which continue to make rapid progress, and appear to sustain no injury unless at the part affected. But in some places, such is now its malignancy that the whole bark becomes diseased, and many young plantations totally destroyed.

It is invariably to be found in excess in the immediate vicinity of water, marshy ground, on all cold retentive soils, and in situations where hoar-frost prevails. Among trees planted on the sides of mountains, where the soil and adjoining grounds are dry, little or no disease is to be found; but it is quite common on elevated situations if they are exposed to fogs, or the vapours arising from damp or marshy ground. I have observed the trees free from disease on a limited extent of marshy ground, and those on the dry ground immediately overhanging it in a diseased state; which would indicate that an excess of moisture at the root is not the cause, but that the exhalations from damp ground have an immediate connection with it. It has appeared towards the *east* coast in all its virulence. There is less of it as you proceed to the *west;* and in Argyleshire, where the climate is more temperate (being removed from the influence of the east winds), and where is superabundant atmospheric moisture, the woods are comparatively free from the disease, but which would have been either dead or dying in similar situations in this part of the country. These observations led me to conclude that a moist climate is not alone the cause of the disease, but that it is produced by an excess of cold and moisture in the atmosphere.

The annual concentric layers of the wood will enable one to ascertain the age of the tree, and by intersecting the original seat of the disease, the precise year the tree was affected may be ascertained. Having examined specimens in which the disease had existed for several years, I found they had been affected in 1826, 1831, and 1832; that it had prevailed to a much greater extent in 1831 than in 1826 or 1832, and the present state of the woods shew that the influence has been much more powerful of late years than it formerly was.

Having obtained permission from the Right Honourable Lord Gray to examine the valuable meteorological register kept by desire of his Lordship at Kinfauns Castle (Lat. 56° 26′ 30″, 150 feet above the level of the sea), I obtained the following important information as to the state of the temperature since the year 1811, and find that the thermometer was at or below the freezing point in May and June in the following years.

	No. of Days at or below 32° Fahr.	Extreme Cold.
In 1812, May,	1	31° Fahr.
1816,	2	30
1819,	1	32
1826,	1	32
1831,	3	29
1832,	1	32
1836,	2	32
1837,	3	31
1838,	5	28
1839,	5	27
... June	1	32

Thus indicating an evident connection betwixt the disease and the years of excessive cold, at the season when the bark is full of sap, and the foliage expanding.

Sir Humphrey Davy, in treating this subject, says, "The canker or erosion of the bark and wood is a disease produced often in trees by a poverty of soil, and is invariably connected with old age. The cause seems to be an excess of alkaline or earthy matter in the descending sap." The observations I have made do not support the opinion of this eminent chemist. I find it is the young and the most vigorous larch-trees that are most liable to the disease, and even in the nursery-lines, when the ground is prepared, and the plants making rapid progress. The apple and pear trees are affected by it, which I think clearly proves that it is neither poverty of soil nor old age that is the cause of the disease.

On examining the disease on the stem of a tree, where it has existed for several years, it will be found that it is not an erosion of the wood, but a disease in the bark, which prevents the vessels from performing their functions; and, consequently, there is no deposit of alburnum or any new formation of wood on the part affected. The fluids being thus interrupted in their descent, a greater quantity passes through the vessels on each side of the disease, which is the cause of the enlargement; and, as the morbid bark seems gradually to affect the new bark, the disease annually extends, which gives it the appearance of an erosion of the bark and wood. I have, in some specimens, seen nature make an effort to recover herself, new cortical layers and fresh alburnum being formed over the diseased part. Sections of the trees shew, that there is no new formation of the layers on the side of the tree at the affected part;—that, after the tree is affected, the layers cease to retain their natural concentric form;—that there is a greater deposit of alburnum on the side opposite the affected part, and these formations corroborate the theory, that the wood is formed by the descending sap;—that there are evident indications of the decay of wood when the trees are affected;—and that, when the decay has made considerable progress, it, in a short time, so much weakens the part, that it must yield to the force of the blast. This will account for the absence of the canker on the stems of old timber.

In the account of the larch plantations on the estates of Atholl and Dunkeld, drawn up from the papers and memoranda of that most successful planter and patriotic nobleman the late Duke of Atholl, I find it stated, that, previous to the year 1795, very severe frosts and heavy fogs prevailed in spring; and, in low situations, a blight, occasioned by an insect, thereafter affected the larch, and that many of those in low situations died. The first appearance of the blight, it is said, was indicated by a substance on the trees resembling small balls of fine white matter, like cotton, inclosing the insect (a species of *aphis*), which appeared to live on the juices exuding from the bark. Many trees were much injured: no new shoots were thrown out that season, and even for a long time afterwards; and the bark was covered with lichens. It appears, however, that the trees shot up clean healthy stems, twenty to twenty-five feet above the fogged part, and the wood, on being cut up, was found to be all quite sound.*

I examined the larch minutely last summer (1839); but I could discover no insect, or traces of any; and there seems to be this difference betwixt the disease of 1795 and the present, that even the diseased trees are now sending out new and vigorous shoots, which, it is said, was then not the case. It, however, occurs to me, that the canker may have also existed at that time, and that it may have been the cause of the death of the young trees; and, for the reason already stated, none of those affected trees are now in existence.

The bark of the larch is now very generally covered with fungi, which gives the trees the disagreeable appearance of being coated with soot. As the diseased part is always covered with fungi, some might be inclined to think that they may be the cause of the canker. With the view of ascertaining this, I took the liberty of sending specimens of sound and diseased bark to Sir W. J. Hooker, professor of botany of the Glasgow University, who was so very kind as to put himself to the trouble of corresponding with a friend on the subject, and to write to me as follows:—"The specimens of fungi on the bark of trees which you sent were so imperfect, and I felt that my opinion on them would be so unsatisfactory, that, for your information, I sent them to the most distinguished fungologist in Britain, the Rev. J. Berkeley, at Wanstead. He says, 'The production on young pines is a farrago of minute black fungi; I find *Helminthosporium*, a *Cladesporium*, and an *Antennaria*. The fungus is probably a consequence of the disease, exactly as the *black wash* on the leaves of orange trees in conservatories, which is *Cladasporium herbarum*, and, perhaps, other fungi produced on honey-dew. In the present instance, the fungi are formed probably on the exusion of turpentine.' I quite agree with my friend Mr Berkeley. Diseased trees exuding moisture, or even in moist seasons, instead of having a clean bark or foliage, are very liable to the attacks of various fungi; but, nevertheless, they do not seem to afford a proper humus to bring them to a state of perfection. I have often observed this to arise again from a bad, and especially cold and wet, state of the soil." The opinion of these eminent fungologists will no doubt be considered decisive that the fungi are not the cause, but a consequence, of the disease.

---

* Highland and Agricultural Soc. Trans. vol. xi. p. 165

The primitive decay of the heart-wood is another disease to which the larch is liable. It has been observed that it takes place in the trees at a very early age, on ground that had formerly been planted with Scots fir. I have no doubt that, on the principle of rotation of crops, the same result will take place, to a greater or less extent, if the larch be planted after any of the rest of the pine tribe. It has also been observed, though not at the same early age, that the trees on wet ground, and those on a very dry barren soil, are particularly liable to this primitive decay of the wood, and from my own observation, I may add, that it also takes place in trees planted on *arable* ground. An opinion now very generally entertained is, that the seed being taken from degenerated trees, the plants in themselves are predisposed to it, in whatever soil they may be planted. This degeneration of the plant is not, however, the cause of the canker, as I have seen it in a plantation of young larch, from seed imported by a nobleman direct from the Tyrol.

I do not pretend to account for the physical action of the climate in producing the disease in the plant. I have only endeavoured to shew that an excess of cold and moisture in the atmosphere is the cause of it. Perhaps, the injury the foliage sustains may prevent the due perspiration of the plant, and the fluids may be deprived of their proper aerial nourishment necessary for the circulation, or a moist and an excessive cold atmosphere may act upon the open texture of the bark, when the vessels are full of sap, in the same manner as it acts on and destroys certain bulbous roots. It is well known to every farmer, that potatoes taken from wet ground and put into the pit in a wet state, or dry potatoes put into a damp cellar, are very liable to be frosted. This appears to me to be the probable effect of the climate.

These facts, I think, are so fully established, that the particular attention of landlords ought to be immediately directed to the subject. In selecting ground for future plantations of larch, they must take care that the situation, climate, and soil are adapted to the nature of that valuable tree; for otherwise many of them will yet lament, not only their having, to no useful purpose, incurred the expense of planting, the loss of interest, and rent, but the far heavier grief arising from the disappointment of the hopes they had formed, of shelter and ornament to their lands, and of convenience and profit to themselves and their descendants.

ON THE RELATION SUBSISTING BETWEEN POPULATION AND SUBSISTENCE.*

This is another work from the masterly pen of the historian of the French Revolution; and, although differing in kind, of equally high mark with *that* celebrated narrative of events.

---

* The Principles of Population, and their connection with Human Happiness. By Archibald Alison, F.R.S.E., &c. Blackwood, Edin. 2 vols. 8vo.

The same lofty, philosophical, and comprehensive spirit, sustains both; it is pervaded by the same general views, and it enforces the same general principles.

At first it may appear, that a work on population is not immediately connected with a journal strictly devoted to agricultural subjects; but, in the analytical sketch which we purpose giving of that before us, the reader will not be slow in finding, that the very essence of rural improvement is involved in its subject-matter, and that the happiness of mankind is, physically speaking, at one with the energy and prosperity of the farmer.

Passing over the introductory remarks on the necessity of a change in the rate of increase in the progress of society, wherein the hunter and fisher, the pastoral, and the early agricultural states are considered, as are also the principles of expansion, as provided for civilized man by the spirit of commerce, and the energy of democracy, we come to the discussion of that great fundamental principle, the relation existing between population and agricultural subsistence.

Mr Alison sets out by shewing, that if the labour of one man's hands had been incapable of producing more than was necessary for his individual support, the race could never have emerged from the woods, and the species could never have advanced beyond the hunter and fisher state; and for this simple reason, that, the moment men commenced the work of agriculture, more food would have been consumed in the time of labour, than could be reaped from the harvest at its termination.

Even if the labour of one man's hands had been adequate to his own support, but no more, mankind could never have attained to a state of civilization. He might have fed himself, but could not have maintained a family. But with agriculture a new era commences. The real relation which flows from this species of toil between man and his subsistence, is, that he can do much more than maintain himself by his exertions; and it is by this excess that the fund is created, whereby, in every age, and in every part of the world, all the other classes of society are maintained. In fact, all these other classes owe their existence to this fund. Necessaries must precede conveniences, and conveniences luxuries. Arts, commerce, and separate professions, are therefore only decisive evidences, where we find them to exist, of the vast surplus fund, remaining over and above what is required for food by the cultivators of the soil.

This fundamental relation between population and subsistence being proved, it is immaterial to shew what numbers of persons are engaged in agriculture, provided always, that the soil will admit of an increase of product. If ten men can raise subsistence for twenty, one hundred can do so for two hundred, and one hundred millions for two hundred millions; consequently, the proportion of the other classes of society must be always determined by the rate of the surplus produce of the agriculturist, and their numbers cannot by any possibility go beyond that rate.

From this it results, that no rapidity of population can keep pace with the increase of subsistence, provided always, that the earth accessible to the cultivators will admit of an increase of produce. This proposition is established by the universal experience of mankind. In savage life, the Indian or Negro, by scratching the earth for a few weeks with the branches of a tree, can raise sustenance for himself and family for a whole year; and it is equally demonstrable, that, in civilized life, if a couple marry and establish themselves on a piece of uncultivated ground, that a great surplus of produce will have accumulated ere any considerable addition to the family meals will be required by the children; and ere twenty years have elapsed, and a second generation are rising around them, new powers of exertion will have been equally successfully put in motion; and the truth of Adam Smith's observation is thus confirmed, that the real want experienced will be in that of hands to go on in cultivating the soil, and gathering in its fruits. The United States is a striking example of the truth of this statement. Since the British settlers landed there in 1640, the population has been doubling itself every twenty-three years; and, although this has gone on for two centuries, the produce of human labour has been far more than sufficient for the most rapidly increasing multiplication of the species, comprehending a most extensive and continued immigration.

Add to this, that, from this surplus, vast cities have been formed, an immense commerce nourished, and capital stored up which has enabled them, the Americans, to be second to none in the enterprise of trade.

In all this the doctrines of Mr Alison run directly counter to those of Mr Malthus, the most celebrated, hitherto, writer on the subject of population. Taking Great Britain for his example, that able economist says, that, by every encouragement to agriculture, and the best human policy, it would be impossible to double the produce of this island within the next twenty-five years. Much less, then, would it be possible to quadruple it within the succeeding twenty-five. He maintains that this would be contrary to all our knowledge of the properties of land. To improve barren parts requires time and labour; and those conversant with agriculture are aware, that, in proportion as cultivation extends, the additions made to the former average produce gradually and yearly diminish. Were even, he adds, the yearly additions made to the former average produce, instead of decreasing, to remain the same—a thing which cannot happen—still his hypothesis of arithmetical and geometrical progression, with regard to population and subsistence, would hold good. According to Mr Malthus, the two rates of increase, if brought together, would be found to be this: Say that the population of Britain in 1798 is eleven millions, and the existing produce equal to their support. In twenty-five years after this the population would be twenty-two millions, and the food, being also doubled, would be equal to this increase. In the next twenty-five the population would be forty-four millions, and the means of subsistence only adequate for thirty-three. In the next period the population would be eighty-eight millions, and the means of subsistence only equal to half that number. Accordingly, in a century, the population would be equal to a hundred and seventy-six millions, and the means of support—lagging behind at only fifty-five—leaving a population of a hundred and twenty-one millions totally unprovided for. To this constant pressure of population on the means of subsistence Mr Malthus ascribes the greater part of human misery, the power of population being so much superior to that of agricultural increase.

These striking arguments are thus answered by Mr Alison, and we think with great ability and success. He allows that, at starting, were every country cultivated to the utmost the proposition would hold good, but that otherwise, it is wholly opposed to the truth. We must give the following paragraphs in his own words ;—

"The population of Great Britain, including the army and navy, in 1801, was 10,942,000 souls, and in 1831, it was 16,539,000, and it is at present (1840), nearly 20,000,000. This is probably the greatest authentic instance of the increase of an old state on record in the world. It is almost as great as the celebrated augmentation of the American States, if the addition of the settlers from Europe, and that of the black slaves, be deducted from the increase of the latter state; for the total free population of America was,

In 1820, . 9,637,000
1828, . 11,348,000
1,711,000, or $17\frac{4}{10}$ per cent.

"The increase, therefore, in eight years was, of free people, 1,711,000, or $17\frac{4}{10}$ per.cent. This rate would give an increase yearly of 177,000, or in ten years about 22 per cent. In thirty years it would be about 66 per cent., an increase not greater than 52 per cent. in Great Britain, if the immense annual migration of Europeans to America be taken into consideration.

"Here, then, is an instance which has practically occurred of the increase of an old and opulent state, with a circumscribed territory, by no means very fertile, even in the very best places, and extremely barren in others. And what has been its condition in regard to subsistence during the latter period, and especially for the last five and twenty years, during which stringent corn laws, except in years of scarcity, have prevented the importation of foreign grain? During that time almost the whole of its subsistence has been derived from its own soil, of only moderate fertility, and, so far has the fact been from any *deficiency* having been experienced in the means of subsistence, the greatest distress has existed, especially during the latter period of the progress, from the *redundance and low price* of agricultural produce. Farther, the consumption of food during that period has enormously increased in proportion to the number of the people: luxurious habits and costly living have descended to an unparalleled degree in the ranks of society: a vast proportion of land of the state has been directed to the raising of butcher-meat, the feeding of horses, and the use of breweries and distilleries; and yet, so far from there having been any difficulty in feeding the people with what remained, the only distress among the cultivators has arisen from the general redundancy of their supply in the market. Distress has existed, and does exist, to a great degree, but it has all arisen from the difficulty of finding employment for the manufacturing, not extracting food from the agricultural population. On the contrary, the cultivators, by adding less than a *quarter* to their numbers since the beginning of the century, have been able to provide food in abundance for more than *double* the number of manufacturers who then existed. So boundless is the bounty of nature, and so rapid the means of increasing food, which she has given to the human species, that an increase of manufacturing mouths, unparalleled in any age or country since the beginning of the world, has not called into a half of its possible vigour the latent powers of an old, and, in many respects, highly fettered cultivation.

"Farther, it appears from the tables quoted in the Appendix, that, while the rate of increase in the population in the manufacturing counties of Great Britain has been constantly and rapidly on the increase, during the last thirty years that the Government census has been taken, the rate of increase in the agricultural has been as constantly and rapidly diminishing. And while the inhabitants of our great towns have during that period been all doubled, and many of them tripled in numbers, the cultivators of the fields have been slumbering on with an increase of only 26 per cent. in thirty years. Yet during nearly the whole of this time the British agriculturists maintained not only themselves, but the whole manufacturing population of the country, and the enormous multitude of horses and cattle which it contained, from the labour of their hands; and, so far from subsistence in consequence proving deficient, it, on the contrary, accumulated to such degree, from 1831 to 1835, the prices of every species of agricultural produce were ruinously low, and in the last of these years wheat fell to thirty-nine shillings and fourpence per quarter, being lower than it had been for eighty years; and although a great importation took place in consequence of the bad harvest of 1838, yet, with that exception, notwithstanding three consecutive bad seasons, in 1837, 1838, and 1839, the empire has maintained itself from its own resources during the last of these years. It is evident, therefore, that, notwithstanding its dense population, and old and long established civilization, and the unparalleled growth of its manufacturing industry, the powers of agricultural production in this island have kept in advance of its population, just as effectually as they have done in the virgin soil and infant civilization on the other side of the Atlantic."

Mr Alison, however, goes farther even than this, and in combating Mr Malthus's hypothesis, asks, with every shew of reason, that since the population of these islands has doubled itself within the last forty-two years, and subsistence has kept ahead, why, if it doubled itself again in the succeeding twenty-five, subsistence should not also be in abundance? The same superiority of man's labour to his subsistence, which obtains so triumphantly in the North American Colonies in the infancy of their career, must, by every argument practical and theoretical, continue to obtain in the British Islands, not only till every spot has been brought into cultivation, capable of being so, but until every place has been improved in its mode of culture to the utmost extent of its possible production. The same unvarying law holds in both cases. Nay, so boundless, contends Mr Alison, are the resources of nature in yielding subsistence to the labour of man compared to the multiplication of the human species, that it will immediately appear that, at this moment, the British population is capable of doubling the whole subsistence raised in the British empire, not in five and twenty years, but perhaps in five,—certainly in ten. The powers of man do not diminish as agriculture improves and society advances; but, on the contrary, are greatly increased, and are regulated by fixed and authentic data.

It is highly improbable, that any old state, like Britain, could double its population in twenty-five years, and equally improbable that the whole resources of the country should be applied to the production of subsistence solely during that period. But were it so, there can be little doubt that, in the space of ten years at farthest, the country could be made to maintain double the present number of its inhabitants. According to the accurate reports of Mr Cowling, adopted by the equally accurate and learned Mr Porter, there is, in England and Wales, 27,700,000 cultivated acres; in Ireland, 12,125,000, and in Scotland, about 5,265,000,—in all, 45,090,000; and of these it is calculated, that 19,237,000 are under the spade and plough, and 27,000,000 in pasturage, which is just about 2 acres to every human being. Now, a full supply for each individual is set down at a quarter of wheat per year, and at that rate, there is only one quarter raised over the whole empire for every 2 acres of arable and meadow-land. This is so far below the average, that, taking all England together, more than two quarters and a half of wheat are raised per acre; so that every 2 acres is capable of maintaining five human beings at the existing average,—that is five times the present number of inhabitants.

To this we are fairly entitled to add, the addition of produce consequent on agricultural improvements; by which we are much within the mark when we say, that every acre might be made to produce a third more: that is, three quarters,—an average at present much below that of many of our counties. Independently of our waste lands, which, according to Mr Cowling, may be set down at 6,000,000 acres, capable of being turned into arable and pasture lands, and at present wholly uncultivated, these islands, on the same data, would maintain 20 millions more. Consequently it follows, that, if these principles are correct, 120 millions of human beings, according to the first view, can be maintained in the British islands, and 180 millions according to the second, and these on wheaten-bread and butcher meat, without intermixture of potatoes or inferior food of any kind. Yet, according to Newenham, three times as much solid nourishment is yielded by an acre under potatoes as under wheat.

Without entering at all into speculative points, Mr Alison therefore sets it down as clear, that Great Britain and Ireland, on the most moderate calculation, are capable of maintaining, in ease and affluence, 120 millions of inhabitants, proceeding on the most liberal supposition, that the whole mountain and waste-land is deducted as unprofitable, and that the remaining arable land is divided into three parts, of which two-thirds are entirely set aside for luxuries and conveniences, and only the remaining third devoted to the staple food of man,—partly in wheat, and partly in potatoes. Startling as these results may appear, they are grounded on facts, which Mr Alison has given at length in the Appendix, and by the consideration and scrutiny of which every reader may be able to judge for himself, whether the data on which they are founded are erroneous, or the conclusions drawn from them overstretched.

Such being the capacity of production in the British islands, it is quite evident, that an agricultural supply could be raised infinitely faster than the race which was to consume it. What, within the last ten years, were waste-lands, now bear ample crops of wheat, oats, and potatoes; and to bring more land into an arable and highly productive state, nothing is wanting but human energy and capital. This being true of ten or a hundred, must be equally so of ten millions or a hundred millions of acres,—provided always the supposition be put on the other side, that there are a sufficiency of hands for the labour. The proportion is the same, and so also is the fundamental fact, that the labour of one man's hands is much more than adequate for his individual subsistence.

Aye, but say some of the opponents to this theory of Mr Alison, the state of society in the British Islands, the appropriation of all the land they contain, and the circumstance of a great part of her capital being embarked in commerce and manufactures, precludes the practical possibility of the whole powers and labours of the empire being lent to the advancement of agriculture. Admitted; but this does not bear on the question, which is, not the direction which human energy will take in the different states of society, but what is the fundamental relation naturally established between the growth of population and the production of subsistence. The moral causes which, in an advanced state of society, draw the energies of man into the channels of trade and manufactures, limit of course the advance of population, if not counteracted by vice or oppression, to a conformity with that state. The great query at issue is, the proportion between the powers of population and production, and if Mr Malthus takes the extreme case of an old state doubling its population in twenty-five years, Mr Alison is equally entitled, on the other hand, to instance a new one, where the agricultural produce is so much in surplus, that it can only be consumed by exportation.

Were the position of Mr Malthus true, on the other hand, that the surplus produce of agriculture is always greatest in the earliest stages of society, and least in the most advanced, the argument would be a powerful one. But it is not carried out by facts. We do not find that arts, commerce, and opulence, have prevailed most in the infancy of society, and that, as numbers advance, these decline; until the necessities of their situation ultimately force all hands into the cultivation of the soil. This has not been the case in any age or nation of the world. Mr Alison well asks, Did the arts and manufactures of Italy decline under the Roman Emperors, and after the Italian peninsula had ruled the whole of the civilized world for a thousand years, were the whole of its population obliged to become cultivators of the soil, to the extinction of arts and commerce? A thousand years have passed since the union of the Saxon Heptarchy laid the foundation of the British Empire, and do we find with us, that, under the pressure of population, the whole of our community are verging into the agricultural state? Or can it be said that America, teeming with the riches of its virgin soil, is the grand emporium from which exports of manufactures are sent to supply the other parts of the world? The fact is directly the reverse. Ancient Italy declined in agricultural produce as the Roman Empire progressed, the inhabitants betaking themselves to towns, subsisting on arts and manufactures; and in Great Britain, at this moment, three-fourths of the nation are engaged in pursuits having no tendency whatever to yield subsistence, and are fed almost entirely by the remaining fourth, which is employed in agriculture.

In the *second* place, the progressive increase of the powers of production over those of population, and that even in the later stages of society, is proved from the statistics of every state. In America, where waste lands are so abundant, and the means of subsistence so profuse, the proportion of the cultivators of the soil to the other classes of society, is as twelve to one. In Poland—our granary in time of scarcity—the cultivators to the artisans and others, are as twenty to one. In France, there are 21,500,000 agriculturists, and only 10,500,000 of the other classes; whereas, in Britain, out of 3,414,000 families, only 961,000 are employed in the production of food. In other words, each agriculturist supports himself, and three and a half more of the unproductive inhabitants. It is thus proved, that England, the oldest, the most peopled, and the richest commercial and manufacturing country known to exist, is exactly the one where the smallest number of cultivators are required to maintain the other classes of society. In America and Poland, where the waste lands are the most abundant, the other classes fed by the agriculturist are the least; and so marked is the difference, that, whereas in Poland, twenty agriculturists are required to produce a surplus for one manufacturer, and twelve are required in America, in France we come down to the proportion of two, while, in Great Britain, we ascend entirely in the opposite scale, and find one agriculturist in ordinary years maintaining above three manufacturers.

It hence appears, that, so far from population pressing on subsistence in the later stages of society, the means of subsistence acquire a decided preponderance over the increase of population in these stages, and that this surplus enlarges just as society advances; these facts explaining satisfactorily, how it happens that, in the earlier ages of a people, so few are engaged in arts and manufactures, and so many in the cultivation of the soil, while, in the later ages, without outstripping the means of subsistence, the citizens double or treble the agriculturists in number.

In the *third* place, it should be considered, that capital is only subsistence stored up, and the whole wealth of the world but the accumulation of surplus labour. In whatever form we find wealth, whether as bullion or money, articles of luxury, costly buildings, or productive investments, it is equally clear that it has been amassed by the labour of human beings, and that these human beings must have been maintained, during this accumulative period, by their own exertions. It is consequently evident, that, if the efforts of human industry had a constant tendency to sink before the gigantic powers of population in the later stages of society, it must have followed, that the annual ratio of capital stored up, must have decreased exactly as population increased—that capital would be most plentiful in the earlier ages, and most scarce in the more advanced—a position found to be totally at variance with truth.

Mr Alison, from these considerations, therefore maintains the argument,—That the true relation between population and subsistence, is that of *cause* and *effect;* and that, by an eternal law of nature, the labour of man's hands is much more than adequate for his support: That this superiority never fails him at any period of his progress; and that, so far from its becoming less in the later stages of society, it is constantly becoming greater, as is proved by their accumulation of wealth, arts, commerce, and manufactures. Mr Alison, accordingly, scouts the idea, that population can ever increase beyond the means of subsistence in any particular country, until the cultivation of that country has approached its acme of perfection, and that the same fear is equally chimerical with reference to the world in general, until the whole globe has been cultivated to the utmost limits of scientific improvement.

That this maximum of population is indefinitely distant, may be predicated from the history of every state which has hitherto existed, all having perished before reaching its limits, either from internal decay, or from foreign conquest. Whether the influence of the Christian religion may give to existing nations an intenser vitality, we have yet to learn. But the most sanguine believers in the perfectibility of the species, are still in the dark as to when the most civilized of European monarchies are likely to reach it; and it is evident to common sense, at all events, that this cannot happen—if it ever is destined to happen—for an indefinite series of ages.

In conclusion, it is doubtful in the extreme, whether the *moral* constitution of human nature renders such an event probable, as that of the human race arriving, in every country of the earth, to the utmost limits of subsistence; and were even such an event possible, the habits of the people, in all ranks of society, must have been gradually accommodating themselves to such an order of things.

But let us return to the physical condition of the globe, and its capabilities. The habitable terraqueous globe contains 37,673,000 square geographical miles, of which it is estimated that 20,000,000 are available for human subsistence. Now, in Great Britain and Ireland, which are much under the medium productive powers of the whole, there are 91,000 square miles, from which food is raised for 30,000,000 of human beings; and were the whole world peopled in the same proportion, there would be about two hundred and twenty times as many inhabitants as there are now in the United Kingdom, or the globe would contain six thousand six hundred millions, which, according to the most accurate authorities, those of Malte Brun and Balbi, would be at least eight times its present population. But when we take into account the greatly superior productive powers of the Southern Hemisphere, and that, in almost all these climates, two crops can be obtained every year, wherever irrigation is practicable; that the potato will maintain three times the number of people on the same extent of soil as wheat; and the banana, according to Humboldt, five-and-twenty times as many, it is not exceeding the line of legitimate argument to say, that the number might be raised to twenty thousand millions, or twenty times the extent of the world's present probable population.

Our limits at present do not enable us to pursue farther this highly interesting inquiry, but we have given, in a condensed form, Mr Alison's views on the first grand section of his essay, the relation between population and subsistence, which is, in fact, one of the great divisions of the philosophy of agriculture.

In our next Number, we intend resuming the subject, and, after giving the leading views of Malthus, Saddler, Say, Godwin, and other expounders of the mysteries of population, we shall conclude with some general deductions of our own.

THE AGRICULTURIST'S NOTE-BOOK—NO. XII.

Beet-root (Betavulgaris).—This whole some, nutritive, and delicious vegetable is but little known, excepting as a garnish, and an insignificant ingredient in salads; but knowing its value as a dinner esculent, we would gladly extend its use. The mode of cultivation is practised by every gardener; little need be said on that head beyond the usual plan—excepting that, if the soil of the garden be clayey, it will be found expedient to drill holes about a foot apart, and the same in depth, which should be filled with sand, and near the surface two seeds are to be sown. If both plants grow, one can be thinned out, and the other will strike deep into the light soil. In the autumn, they will be fit for the table, and for winter consumption they must be treated as carrots and parsnips are: that is, laid in sand in some convenient out-building, safe from frost. As this root attains a larger growth than either of the two just named, they will require a longer time to be cooked; from three-quarters of an hour to an hour and a half, according to the bulk; the only care to be taken is in preparing it; instead of scraping the root it is to be brushed, and the crown with the footstalks of the leaves, to the length of an inch or more, must be left on. When boiled sufficiently tender, it should be taken up, and then scraped or rather peeled, the crown cut off, and neatly trimmed for table. Some persons like its peculiar flavour when hot; but the perfection of our favourite vegetable is when cold. After it is removed from table, then, instead of sending it with other surplus esculents to the pigs, it is to be cut in slices like a cucumber, but very much thicker (a quarter of an inch in depth would not be too thick) laid in a vegetable dish in layers, between each of which salt is to be plentifully sprinkled; and over the whole cold vinegar is to be poured, till the slices are covered. In an hour the vinegar will have assumed a beautiful deep red colour, without abstracting any of the rich hue from the root; and by the same night, it will be ready to make an elegant side-dish for supper, to be eaten alone with pepper and oil, or with cold meat, or even cheese. In this state it keeps good for a fortnight, more vinegar being added if needful. It will be obvious, that our directions for care to be taken in preparing it for boiling, are in order to preserve the beautiful colour as much as possible; for if it be scraped or otherwise injured, the root will look pale and unsightly. In this cooking age, the stomach is infinitely gratified through the eye; therefore no farther reason need be offered.

Dogs—Food for, and Rational Treatment of.—It may appear somewhat trite to intercede for "poor dumb animals;" but we are contented to abide reproach for the error of commission, rather than that of omission, when the comfort of our brute friends is concerned. We believe that, in large communities of the canine race,—kennels of hounds, for example,—there have been of late years, in their management and education, greatly more humanity and rational treatment evinced, than used formerly to exist; when a system of stern coercion was alone employed to reduce the animals to, and retain them in, subjection. For aristocratical dogs, then, we do not intend to bespeak our reader's sympathy; it is for the faithful, patient, vigilant, helpless guardian of the premises, —the yard-dog, in his galling thraldom,—to which we would draw attention. We take him from his state of nature, we devote him to our service, we fully expect that the chain by which we bind him to his kennel is also to link his affections to ourselves, and his services to our individual interest; and in return for his invaluable honesty and sagacity, we reward him with a daily meal of (too probably) putrid trash, food from which, if he were roaming at large, he would turn with disgust, but which hunger and imprisonment oblige him to swallow. To servants, eye-servants, we entrust the comfort of that most estimable of all domestic animals.

Weeks and months move by, and still the yard-dog is fastened to his ell-long chain, debarred from requisite air and exercise, all his instincts crossed but that of guarding the property entrusted to his care; no loving hand to caress him, and draw forth that affecting exuberance of—all but—speaking rapture, which the notice of a friend will always excite! No! hundreds and thousands of these wonderful creatures are doomed to eternal slavery and confinement, kicked and cuffed by surly and grudging menials, and seldom or never visited by the man for whose safety all this misery is inflicted.

We are an anomalous people, we English: now that anti-slavery has obtained again such vehement support, we should not feel surprised to hear of societies being formed among us for the suppression of cruelty to cats in the West Indies, while at home we encourage the monstrous barbarity inflicted on little chimney-sweepers, and require to be admonished respecting our ill-treatment of dogs,—those best friends that Heaven has bestowed upon civilized man.

In a savage state, the dog is the companion of his master, hunts with and for him, and enjoys all the privileges of his nature: in society, man preys on his brother, and dogs are requisite, in order that one class of human beings may be enabled to sleep securely from the assaults of another portion of the community! Appalling as is this fact, we have but to submit to the mysterious fiat which has placed this curse of insecurity upon the members of civilized life.

One of the fearful contingencies that results from this unnatural immuring of our yard-dogs from *necessary liberty*, is the perpetuation of hydrophobia. If man err through a cruel and wilful disposition, it is but right that he should suffer for his crimes; but "if he have not the wisdom which is profitable to direct," it appears somewhat hard, that the innocent should suffer for the faults of the guilty; yet such is too frequently the case: thus, a dog, the servant of a cruel master, scantily supplied with water, ill fed, crossed in his instincts, and prevented by confinement from procuring that natural medicine which Nature has abundantly supplied, and to which he would resort, if occasional liberty were allowed,—this dog "goes mad," escapes from his prison, and attacks, perchance, many persons, all guiltless of injury to him, while the author of the havoc, too probably, remains uninjured. These mysterious "dispensations" are no doubt puzzling to those who look but on the surface; but to him who doubts not the benevolent plan of the Creator, the evil is but another proof of His intention that man should exercise those faculties and worthy propensities which every human being possesses (more or less); and which were bestowed that we may advance towards that perfection which is implied by the expression, "And God created man after his own image." How imperative, then, is our duty to attain all knowledge that shall tend to this noble end! How necessary to exert our faculties—to act as rational beings, to reason, and to obey!

We have a theory, that the extermination of every disease is within the power of man. It is pretty clearly established, that unanimity of action is alone required to banish that scourge of humanity, the smallpox. Contagious fevers, too, would be mastered by cleanliness, ventilation, industrious removal of putrefying vegetation, &c.; and why might not the horrors of hydrophobia be subdued by a rational and merciful attention to the health and habits of our four-footed friends?

> "The quality of mercy is not strained,
> It droppeth as the gentle rain from Heaven
> Upon the place beneath: it is twice blessed;
> It blesseth him that gives, and him that takes."

Where is canine madness so frequent as in England? and where else are dogs so rigidly debarred from free recourse to their natural and requisite medicine?

When the calamity occurs spontaneously (for we allude not, of course, to that which is caused by the bite of a rabid animal), what species of dog is attacked by madness? Is it not the creature in confinement? In the accounts of which we read, do we not see that "*he broke his chain*, and made his escape," &c. are we not told invariably, that "he had become dull and heavy-eyed, refusing food, and betraying no joy at the sight of those whom he knew?"

In the hot countries of Southern Europe, *i. e.* Turkey and Spain, as well as in Egypt, dogs abound, and they are always at perfect liberty, yet the disease is there unknown; indeed, if it were there to occur, the human race could scarcely escape extinction; where myriads of animals congregate, consequently, contagion would spread with a rapidity exceeding that of the plague.

It has been erroneously supposed, that dogs are more liable to hydrophobia during the heats of summer; nay, the "dog-days" have had their believers, as influencing the destinies of these animals; but so far from the fact is this, that we have noticed to have heard of more frequent cases of madness in the winter months, than in that of season, "when the *dog-star* rages," namely, the middle of summer; that atmospheric heat has nought to do with the matter, is proved by the above fact, that the disease is not known in the hot climates where these animals exist in multitudes.

We were led to form a few rational opinions on the subject of the treatment of chained dogs, from the following circumstance:—Our own yard-dog, a favourite with the whole family, was frequently allowed the recreation of a scamper, but from some cause, the indulgence had been omitted for many days. We were standing at a window overlooking his kennel, when our attention was attracted by his whining, and running backwards and forwards at the full extent of his chain. These movements were unusual, and indicated distress. On going towards him to ascertain if his daily supply of fresh water had been forgotten (which was not omitted), he evinced extreme anxiety to be let loose; we gratified his wish, and instead of evincing his usual expressions of delight, by bounding and frisking around us, he darted off instantly, and made his eager way into the orchard, where we followed, and found him eating the leaves of couch-grass (*Triticum repens*), with an avidity quite unprecedented; from one root he ran to another, off again to a third, fourth, fifth, before he could desist, or bestow his usual notice upon us, and we then observed a curious circumstance, which we have invariably noticed since, whenever the animal has recourse to his vegetable aliment, or rather medicine (and this occurs almost daily, proving that Dr Darwin was not correct in his supposition, that when dogs eat grass, rain will speedily follow); we watched him closely, and found that he bit off the middle of the blades of couch-grass, one after another, eating neither the tips nor the portion near the root, rejecting, too, the old as well as the very young leaves, so that not more than three or four shoots were selected from each tuft or root which he visited. We have observed the same choice made by a cat. The fact is stated without an attempt to account for it, nor would we have mentioned it, had not our opportunities of observing it been of constant occurrence.

Reasoning by analogy, we should say that the usual food of dogs which are confined is of a nature to induce disease; instinctively they take excessive exercise, and when they are enabled to do so, their food may consist of any kind, however coarse, and carrion; for any ill effects would be counteracted by the use of their own abundant medicine, and by the constant and violent exercise in which they delight; but when we place a creature in an unnatural situation, thwart his instincts, habits, and propensities, and force him to adopt a less healthful mode of life, and yet injudiciously ply him with food, we are guilty of a great wrong, and an absurdity unworthy of an educated and reflecting nation. Those among us, gifted with good sense and judgment, who should be obliged to adopt a sedentary mode of life, would immediately alter our diet to suit our altered state; and from generous living would restrict our daily meals, and allow them to be of a lighter quality, well knowing that, unless such prudence were to be exercised, our health would inevitably suffer; yet, with this obvious fact before us—this analogous case by which to judge—we heedlessly risk the health, and perhaps life, of our useful friends, by following a course completely opposite: we keep them confined, and supply them with food of the coarsest and rank-est kinds—horse-flesh, offal, graves, and flesh in every stage, from that of sweetness to that of decomposition.

In the south of England it is much the fashion to give sporting-dogs a food called dog-biscuit instead of barley-meal, and the consequences resulting from this simple aliment are most gratifying. Barley-meal, indeed, is an unnatural food, unless it be varied with bones, for a dog delights to gnaw, and thus to exercise those potent teeth with which nature has furnished him; his stomach, too, is designed to digest the hard and tough integument of animal substance; hence, barley-meal, as a principal portion of his subsistence, is by no means to be desired. In small private families it is not always possible to obtain a sufficiency of meat and bones for the sustenance of a dog, and recourse is too frequently had to a coarse and filthy aliment, which is highly objectionable, especially if the creature be debarred from taking daily exercise, fettered by a chain, and restricted, by situation, from obtaining access to grass; and no one who has not watched the habits of our faithful allies (as we have done), can be aware of the absolute necessity which exists for his obtaining a constant supply of it. If no other good effect resulted from it than the sleekness of his coat and clearness of his skin, these benefits ought to be procured for him; but when his health and comfort are to be also ensured, who, that has a grain of benevolence in his disposition, would hesitate to perform so simple and gratifying an act of duty?

Dog-biscuit is a hard and well-baked mass of coarse, yet clean and wholesome flour, of an inferior kind to that known as sailors' biscuit; and this latter substance, indeed, would be the best substitute for the former with which we are acquainted. A bag of dog-biscuit of five shillings' value, will be an ample supply for a yard-dog during the year: it should be soaked in water, or "pot liquor," for an hour or two; and if no meat be at hand, a little dripping or lard may be added to it while softening, which will make a relishing meal at a trifling cost. We have for many years known the utility of the plan thus advocated, and we earnestly recommend all who value the safety of the community and their own (to say nothing of the happiness of the canine race), to make trial of the rational and feasible plan which we have detailed.

Cream-Gauge, or Cream-Glass.—When new milk is set aside for a few hours in a cylindrical glass-vessel, the cream ascends to the surface, where it may be seen and measured. If the vessel be ten inches deep, and properly graduated, every tenth of an inch on the scale will indicate one per cent. of cream. Such an instrument would be more properly termed a cream-gauge or cream-glass than a lactometer.

This cream-glass, merely calculated to shew the proportion of cream in a given specimen of milk, would be very apt to mislead an observer, who should hastily jump at conclusions from a few occasional observations. It fluctuates even more than the barometer, and like that useful and calumniated instrument, always tells the truth, but can be understood only by him who questions it constantly, and takes the trouble to study its real language. In the one glass, as in the other, it is the *fluctuation*—the rising or falling—whether of cream or quicksilver, and not its stationary point at any given time, that gives faithful warning of approaching change for better or worse. In every dairy the quality and quantity of milk are liable to very frequent and sudden changes from a variety of causes, some affecting a single animal, some a whole herd; and from a patient attention to these *disturbing influences*, it is probable that many conclusions of a useful practical nature might be deduced. A large establishment is by no means necessary for such inquiries. I can safely say that a good deal may be learned from two or three cows, especially if they be entrusted to rude and inexperienced servants.

Whenever a sudden and marked change takes place in the *quality* of milk, there will be usually found a corresponding change in *quantity*, be this for better or worse. I believe, too, that as milk grows richer or poorer in cream, it grows proportionally rich or poor in curd. I speak now of comparative experiments made upon the milk of a single cow, or of a particular dairy; but it would be absurd to suppose that the milk of one animal yielding a large flow will be of better quality than that of another yielding only half as much. The reverse is nearer the truth. A long-horned cow, for instance, may give excellent milk, but scanty measure; one of another breed may afford a profuse supply of thin poor watery stuff. Still it would be equally true of either animal, that, by good or bad treatment, a change manifest at once in the quantity and quality of her produce would be evident at the same time. So that if we should note down the *quality* of the milk as indicated by a cream-glass, and its *quantity* as carefully measured, day by day, the registers would be found to correspond in a very surprising manner, and we should soon be forcibly struck with the frequency of those *disturbing influences* to which I have before adverted.

To the detection of these *disturbing influences* I would very seriously invite the farmer's attention; and as a useful auxiliary in revealing incipient mischief, the cream-glass will be found very convenient when the measure cannot be relied upon. But they should go together, and the dairy register would soon prove an efficient and profitable dairy reformer.

It were superfluous to enlarge upon the loss accruing to the husbandman from the wanton neglect or ill treatment of his cattle by servants—from bare pasture, bad fodder, bad water, foul air, chasing by dogs, fighting one another, &c. But I am not sure that the injury produced by inclemency of weather is duly appreciated. Yet this appears to me one of the most frequent and most pernicious of *disturbing influences*. If this view shall be confirmed by observation on an extensive scale, interest and humanity will equally dictate the providing of additional shelter, and the selection in all cases of a stock sufficiently hardy to bear the unavoidable exposure. It might be worth inquiry whether some breeds are not better adapted to the dairy in winter, and some in summer—some for stock-feeding, some for open pasture. Sudden change of food, even from good to better, has been pointed out as exerting a marked *disturbing influence* upon the flow of milk. This opens a wide field for inquiry, as some writers recommend variety in the food of dairy-cows. My own limited experience, supported by obvious arguments from the physiology of suckling animals, but contradicted by custom, would incline me to the opinion that cows, sufficiently fed, ought to be milked more frequently than is the common practice. Contrary to the received dicta on the subject, it has appeared to me that the longer the interval between one milking of a cow and another, the poorer is that cow's milk. Still I write this notice, and, indeed, the whole of this paper, to be taken with all the distrust that is deservedly attached to it.

[The hints thrown out in this paper are well worth every farmer's while pondering on. Editor.]

A peculiar mode of raising Turnips, by Mr James Main, Chelsea.—I beg leave to inform my readers of a practical expedient which English farmers sometimes have recourse to, for increasing their sheep-keep, and which almost always turns to good account. I know not whether it is ever practised in Scotland, but I am sure it might answer as well on any *carse* land there as it does in England.

It is unnecessary to state how valuable any kind of green food is to the live-stock farmer in the winter and spring months. The difficulty and risk of wintering cattle in many places of Great Britain and Ireland, is a serious drawback on the prosperity of the farmer in such places. Even in the comparatively mild climate of the south of England, a scarcity of spring keep is often felt, owing to the loss or scanty supply of the turnip crop. As one means of repairing such loss, the early stone turnip is sown on the first piece of wheat-stubble that is cleared, and which sometimes answers well, but at other times only yields a scanty bite of green leaves for couples in the spring.

But the most successful expedient for eking out the turnip crop, and to which I particularly wish to call the attention of farmers who have never tried the scheme, is to sow a fair sprinkling (about 2 lb. per acre) of seed among the beans just before they are hoed for the last time. If the land has been well cultivated for the beans, and has been once horse or hand hoed, the surface will be in pretty good order to receive the turnip-seed, and the seedlings will not be at all checked by the shade of the beans, but rather encouraged. I have seen as fine a crop of white Norfolk turnips among beans in the month of October as I would wish to see by any other mode of management.

If the beans are intended to be followed by wheat, the turnips are, as soon as the beans are carried, drawn and stored, or placed close together upon a piece of dry pasture, where they will keep good till wanted, unless very severe frost happen, in which case storing is the best plan.

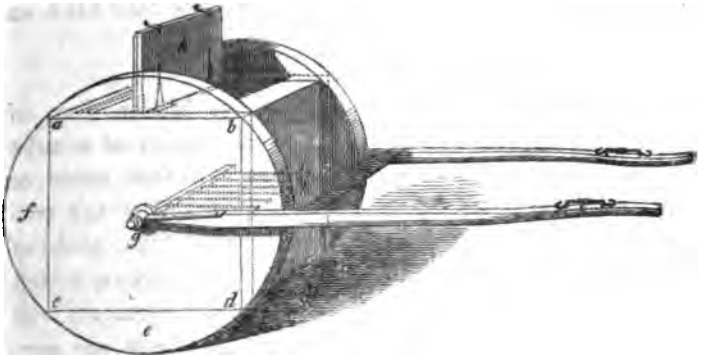
When the beans are ripe, they are mostly drawn by the hand, bound, and set up in stooks in the common way; or they may be reaped if it can be done with more dispatch or convenience.

If wheat is not to be sown on the bean-stubble, then the turnips remain to be folded off like other turnip crops in the spring, and the land comes in for barley and grass-seeds in the usual course, provided the nature and condition of the land allows of such cropping. But wherever turnips can be made to grow, barley will certainly succeed if the necessary preparation be bestowed.

As every means of increasing winter fodder and green food for store or fattening stock is of the utmost importance to farmers in general, the foregoing hints on raising turnips along with beans, and with very little extra labour, may not be unworthy the notice of some of my readers, who may have an opportunity of making a trial of the plan.

Swedish Mortar-Plaster Cart. By Peter Möller, Esq. of Laholm and Skottorp, Sweden.—The cart consists of a cube (*a*, *b*, *c*, *d*) of a side of 2 feet 11 inches or 3 feet, made of battens 2 inches thick. The wheels are formed of the two sides, on which are fixed circular segments *e*, *f*, &c. made of strong battens, 3 inches thick, and secured by screws, which enter into the sides of the cube. The circular segments will also cover the joints of the cube sides. The wheels are surrounded by iron, as in common wheels. One screw is put at *each* end of the segments *a*, *b*, *c*, *d*, and covered by the wheel iron. The axle, inside and outside, is well and *closely* attached to the cube, so as not to allow the least mortar to come out. The axle moves in the small iron nave *g*, fixed to the shafts of the cart, and, in turning round, makes also the whole cart turn round. The lid *h* is well secured to the cube by hinges and hesps, and folds down so as to fit close. On the axle are screwed iron-bars *i* to break the mortar when it begins to be tough; they pass through the side of the cube, and fastened with screws at *k*. If these bars be found not to work the mortar sufficiently, other similar iron-bars could be put through the opposite side of the cube.

The lime is first put into the cart by the lid, and sprinkled over with a little water; about half a gallon of which per bushel of lime will be enough the first time. The cart is then driven round a while, and when the driver, who must often look at the mortar, finds that all the water is imbibed, a little more must be thrown in, and the cart again driven. Pouring water in little quantities is continued till the lime forms coagulated masses or balls, and then it is worked until, on breaking the mortar mass, no lime is to be seen dry in the mass. No description of the method need be given, the success of the plan depending upon the care of the driver, who will very easily learn it after one or two carts-full driving. Three bushels of lime, or of lime and sand, can be prepared in it in two or three hours. If sand is used, it is put in after the lime has been sufficiently wrought.



Winning the second crop of Clover.—Although the practice is unusual in this country of taking a second crop of clover from the same ground in the same year, and it is certainly a severe mode of cropping for the land, yet, as it is desirable where the practice is pursued, to use the best means of most effectually securing the crop, we would direct the attention of our readers to the method adopted by Mr Bell of Huntbill for securing it. It may be remembered that Mr Bell communicated a short notice of his practice to the Highland and Agricultural Society, which appeared in the 48th number of their Transactions. Last spring the portion of the hay left from consumption was inspected, and found to be in a satisfactory state, and since then Mr Bell has received an account of the adoption of his plan in a pastoral district, where it is known hay is generally very difficult to be preserved in a sound state. Before instancing the state the hay was found in in spring, and the adoption of the method by any other person, it may be proper to repeat Mr Bell's process here, as the account will appear on these pages before the season of putting it to the test shall have arrived. The object of the process is, to let the hay escape the injury usually arising from the method generally practised of letting it lie on the ground just as it fell from the scythe.

" On Thursday 26th September 1839, an acre of a heavy second crop of clover was cut. On the same day, a stack of oats was thrashed, being also the produce of about an acre; and the straw was spread on the surface of the grass as it lay on the ground. That same evening the whole, without being worked up in any way, was put into hand ricks. On Saturday the 28th, the whole was spread out, and in the evening it was put up in larger ricks, about three of the first in one. On Monday the 30th, the whole was again spread out, and in the evening was put in larger ricks, standing about six feet high. It was then considered to be quite ready to be carried to the stack; but on Tuesday the 1st October, the weather, which had been good, changed, and a heavy rain wetted the whole to a serious extent. On Thursday the 3d October, however, on being once more spread out, the whole was found to be so dry that it was put up in large tramp ricks, in which state it stood for about two weeks. It was then stacked, and has remained ever since in the best condition, no part of it having become at all heated, and the whole being as fragrant as the best clover hay.

" Horses preferred it greatly to the hay of this season of good quality, and the straw was eaten as readily as the grass, with which it is intimately mixed. One horse was kept upon it for several weeks, and improved materially in condition.

" Another acre was treated in the same manner, and as no wet weather occurred, it was stacked in about ten days."

This was the state of the hay at the beginning of summer given in Mr Bell's own words.

"Since the above notice was published, the experience has been had of the use of 700 stones of this hay during the winter and spring months, and about a hundred stones are still left on hand. The cattle and horses have eaten it freely, and continue to do so to the present time.

"Where a quantity of the clover happens to have been kept together, it is brown in colour, as is usual with the best clover hay. Where it has been intimately mixed with the straw, the stem and leaf remain essentially green, and the flower red. The whole mixture is fragrant, and in excellent condition.

"Conceiving that, by this process, the winter food of cattle and horses may be easily, cheaply, and largely increased, and that, in bad hay seasons especially, benefit would accrue to the country at large from the method being made known, and an authoritative opinion given respecting its merits previous to the ensuing hay season, I submitted the matter to the consideration of the Directors of the Highland and Agricultural Society; and the Board suggested the expediency of those Directors who reside in my vicinity being requested to meet and give their opinion in a short report, after inspection of the hay."

In pursuance of the suggestion, Mr Aitchison of Drummore, one of the Directors of the Society, inspected the hay, and thus wrote to Mr Bell on the 11th June 1840:—"I inspected, last Saturday, the remainder of the small stack of hay at Carberry, made of the second crop of clover, mixed with oat straw; it appeared to me still sweet and fresh, and, on the whole, I think the plan you have adopted in making hay a very good one."

A sheep-farmer having no straw to use, made use of some of the dry hay of the year preceding, and he gave the following account of the operation, which seems to be applicable to saving the first crop of hay.

"Those who know the trouble, expense, time, and risk incurred in making hay in upland moor farms, will readily appreciate the great importance of any method by which meadow-hay cut upon *Wednesday* and *Thursday* can be put in excellent condition into a tramp-rick of 40 or 50 stones on the *Saturday*, safe from all accidents, and at so little expense.

"I did not follow your instructions to the letter, having mown the hay on Wednesday and Thursday (29th and 30th July), then led the old hay, mixed it, and ricked it on Friday; put it out again on Saturday, which was a beautiful day, and built it in ricks, tramped by a girl, each rick containing a small cart load, in famous condition; the effect the old dry hay, has truly astonished me, and I can easily perceive that straw would be still better."

Which is most profitable, Horse or Manual labour?—We give insertion to the following remarks on this question, which seems worth inquiring into in the remote parts of the country, at the request of Mrs Davies Gilbert, Eastbourne, Sussex, a lady whose active interest for the prosperity of agriculture, and the improvement of the condition of the labouring poor, may fairly be set as an example for many country *gentlemen* to follow.

" When the *Farmer's Magazine* for March, page 197, gives the report of the Trentham Farmers' Club, on the subject of the best and most economical method of keeping cart horses, and the number required for 100 acres of arable land—and comes to the conclusion that five horses are barely sufficient for the cultivation of 100 acres.

That the cost of keeping such horses, on an average of years, will not be less than	L.105	0	0
or twenty-one guineas per horse; and it is clearly shewn, that the cart-horses required for the cultivation of a farm consume *one-fourth* of the produce, to which must be added attendance, which, at the rate of one man, at 14s. a-week, and one boy at 4s., is L.46, 16s. and the fifth horse in the same proportion, L.11, 14s. come to, .	58	10	0
Wear of harness, ...	1	17	0
Stable room (which would make a house), . . .	3	0	0
Shoeing at 12s. each, ...	3	0	0
Price and loss on animals which consume without being consumed, supposed average, ...	13	9	0
	L.184	16	0
Thus, not only a fourth part of the produce of the land goes to horse-keep, but upwards of two-thirds of another quarter: Whilst four men would dig land at from three-halfpence to threepence a-rod, and hop ground is dug for much less; and four men at 12s. a-week, cost only, .	124	16	0
	L.60	0	0
And these men's wives and children by hoeing the land twice at 5s. per acre, might earn, ...	L.50	0	0
To add to the man's gains and his master's too, as weeding is indispensable in those who wish for good crops. And women and children may likewise earn, . . .	40	0	0
	L.90	0	0
added to the	124	16	0
make	L.214	16	0
Carry forward,	L.214	16	0

Brought forward, L.214 16 0

By dibbling as practised in Norfolk, Suffolk, Lincoln, and Hertfordshire, on an average of 8s. per acre, making the gain to each of the four families, if numerous enough, L.53, 9s. a-year; and that dibbling answers, appears by its saving from one to two bushels of wheat as compared with that by broadcast per acre; for, being deposited 3 inches in the earth, it is below the reach of birds and frost, and deep-rooted, it resists wind and rain, and produces four bushels per acre more than when broadcast, which, with a half of seed saved, amounts to five bushels and a half per acre, or 550 bushels, worth, at 60s. a quarter, 100 acres, ... L.206 0 0

"At Eastbourne, men with hand-carts have thankfully drawn out manure, &c. a quarter of a mile, and harrowed and rolled land cheaper than horse work, and for years have, for L.6 per acre, chalked the downs with hand-carts, when L.8 is allowed for horse-cart work. And at Willingdon, they have this winter dug with forks, 14 inches deep and 7½ broad, as used in Norfolk, seven acres at 3d. a rod, which is L.2 the acre, ridging it 2 feet wide, and 18 inches the sides of the ridge, and the subsoil being put on the top of the ridge, has had the benefit of the frost before mixing with the previously cultivated soil; consequently, one digging is considered better than three ploughings, which are there charged at 45s. per acre.

"Now, as men can cultivate the soil cheaper than horses, would it not be desirable to let them do so, instead of keeping them useless in the Union houses? The number of paupers in the Eastbourne Union House, March 5. was 259, which is 40 more than at this time twelvemonth, and out of them 121 are able-bodied, from 9 to 60 years of age, to help employ whom 900 acres at Eastdean are offered to be let on the following conditions, in parts with suitable buildings:—No grain broadcast; no draught horses used; straw all used for food or litter by stall-fed cattle; no two-grain crops in succession; and no hay or straw sold off the premises. And on this farm is a tank and pump for liquid manure, and as many more will be made as needed,—for in Belgium the liquid manure from cow-houses is contracted for at 40s. per cow annually (see the article *Dairy* in the Penny Cyclopædia, by the Rev. Mr Rham). And the successful management of the Dutch dairies is proved by the fact, that, although the population is much greater than in England, our paupers are fed on the surplus they have to export, and all are well acquainted with Dutch cheese.

"It may be said—that the men cannot draw the grain to market; true, but the first page of the English Agricultural Society Transactions says, the average produce of wheat in England is only 26 bushels per acre; and after deducting 3 for broadcast seed, leaves only 23 bushels per acre to send to market. And one hired waggon would take the produce of 3 or 4 acres, if there are no working oxen kept. In the great town of Frankfort, cows may be seen drawing in the produce of small farmers; and all the green crops would go in on the legs of the stock fed on them.

"It is hoped if these few data on the subject of manual labour incite further inquiries, they will be communicated to the *Labourer's Friend* or the *Farmer's Magazines*, and that the Clergy will see the advantage of thus lowering the poor rates, which now, in many cases, amount to a fifth, and even a fourth, part of their tithes. Whilst crime is naturally increasing, from the great difficulty of getting work in South Britain; since farmers no longer hire their men by the year, as they did here formerly, and still do in Scotland, where the poor rates, in *country parishes* in the Highlands, are hardly perceptible, and even bordering on England, two years since, did not exceed sixpence in the pound; does not policy then, as well as humanity, plead in favour of Manual Labour?"

Introduction of Merinos into Scotland.—The introduction of Merinos into Scotland direct from the continent forms, we believe, a new fact in the husbandry of this country. This has been accomplished by Mr Graham of Kincaldrum, in the county of Forfar. As the fact itself is new, it deserves a little attention from us. About six years ago, Mr Graham caused a friend of his in Brauensburg in East Prussia to send him some Saxon sheep. These had been exhibited at a great show which annually takes place in that country, and at which the ewes purchased for him had obtained the highest prize. To give some idea of the price these sheep cost Mr Graham, we have only to mention the fact, that a brother of Mr Graham's rams was sold in Prussia three years ago for the sum of 1000 rix thalers, equal to L.143 Sterling. On their importation into this country, the sheep were kept on the lawn around Kincaldrum house throughout the year, with the assistance of a few turnips and straw in winter, and a covered cot into which they could retire at night and in bad weather. Mr Graham bred from them for a few years, but found them too delicate in the constitution for the climate, from the want of the proper warmth and shelter they had been accustomed to abroad in winter. He then thought of crossing them with other sheep, putting the Leicester tup to the pure Merino ewe, and the pure ram to the Cheviot ewe; and the experiments have succeeded remarkably well.

The crosses are quite as hardy as the native breeds of sheep, requiring no other attention, and bearing to be soiled in winter on turnips in the field. The produce of both crosses have grown and thriven well, promising to be well formed and weighty sheep, but, as it was only last year that Mr Graham began the crossing, and the sheep have not yet had time to attain to their full growth, it is as yet impossible to say to what weight their carcasses may ultimately attain. With regard to the wool, which is now-a-days an important particular in the breeding of sheep, the quality of that of the pure Merino is very fine, for, although it is an admitted fact that its quality does deteriorate a little in this climate, still it is far finer than that of any of the native breeds. Three years ago, Mr Graham's fleeces fetched 3s. 6d. per lb. in Edinburgh, and the average clip was fully 4 lb. per carcass. The cross-wool is of course not so fine, but still very fine, and of a different texture, and far superior to any produced in this country. The fleeces of these weigh fully 5 lb. each, and in order to let sheep-breeders themselves judge of its quality, Mr Graham, we understand, intends to exhibit his wool at the Highland and Agricultural Society's show at Aberdeen next October. As we believe that Mr Graham has a few pure rams to spare, as well as a few cross ewes and tups, it may be worth while, now that the opportunity is within their reach, for some of our sheep-breeders to try a cross with the pure Merino ram and the Leicester, Southdown, and Cheviot ewes, with the view of improving the quality of the wool, and at the same time seeing whether the symmetry and weight of the carcass cannot be maintained. The experiment of maintaining the carcass of the native breeds with the Merino cross, was tried long ago, from 1788 to 1804, by his late Majesty George III., and did not then very well succeed, but we conceive that many circumstances then operated to frustrate the object of those experiments, as well as those of a later date made by the Merino Society of 1811. Among other disturbing influences may be mentioned the then recent introduction of an unknown race of animals,—the general ignorance of the principles and practice of breeding sheep then, compared with the extended knowledge of these essential particulars in the present day,—and the peculiar circumstances under which a royal flock was likely to be attended to. But these objections do not hold good now, and so far as the nature of the breeds themselves is concerned, there seems nothing to prevent the carcass of the Merino to be improved as well as that of any other breed. Indeed, so far from that, the late experiments of Lord Western rather hold out a strong encouragement to breeders to try the experiment. Lord Western has challenged all England to produce superior sheep to his Anglo-Merino in symmetry and fat. We had an opportunity of seeing some of them at the Oxford Show of the English Agricultural Society last year, and must say that prettier sheep were not exhibited on the ground, nor any that proved fatter both inside and out,—or died better as the phrase has it,—on being slaughtered. The remarkable feature of these creatures was their carrying their fleeces for three years, during which, it seems the fleeces acquire a much greater proportion of the weight of 38 lb. in the latter years than in the first year of that period. This interesting fact, now that it has been ascertained by experiment, is indicative of the possibility of uniting a fat carcass with a fine fleece—a union, the possibility of which, has long been denied by sheep-breeders in England. We do not profess to explain the reason why Lord Western's sheep retain their fleeces in an unbroken state for more than one year. We shall feel obliged to any of our correspondents who can give us a satisfactory explanation of the circumstances, to do it. Perhaps the practice of keeping the sheep constantly in the house may have some effect in producing the result, and if so, then we may expect that our other breeds might be made to produce the same effect, now that the practice of housing, in winter especially, is gaining ground in England. Altogether, we conceive that experiments in crossing and housing the different breeds of our sheep, may bring out highly interesting results, as well in regard to the symmetry of the carcass, as the quality of the wool and the properties of the fleece.

The Ægilops changing into Wheat.—Some time ago we inserted an account of some experiments made by farmers in Forfarshire, which seemed to sanction the probability of the tarnsference by vegetation of the smut-balls found in wheat, into a plant of the genus *Bromus*, a kind of plant nearly allied in its botanical characters to the genus *Triticum*, and the paper, we remember, had the effect of raising the incredulity of our readers. To afford their incredulity another occasion upon which to exercise itself, we submit the following remarks of M. Auguste de Saint Hilaire on a kindred subject, to their attention. "Some botanists have thought, in consequence of the extreme resemblance of the fruit of the *Ægilops* to the grains of cultivated wheat, that the latter was only an *Ægilops* modified by cultivation. M. Auguste de Saint Hilaire says, from a letter from M. Frederic de Girard of Montpellier, that M. Esprit Fabre having found last year in the environs of Agde, some plants of the *Ægilops triticoides*, had sown the seeds of them in his garden, and had obtained a plant in which the characters of the *ægilops* has almost disappeared to make way for those of a *triticum*. It is not yet altogether a *triticum*, it is no more an *ægilops*. M. Fabre proposes to sow next year some grains collected this year (1839), and to continue the observations he has begun."*

Relation existing betwixt the Shape of Animals and the number of their Pulsations and Inspirations.—Messrs Sarrus and Rameux have constructed a table of results, obtained from observations made upon soldiers belonging to the same battalion, men all in good health, placed under the same conditions, and whose sizes had been accurately ascertained. "The numbers indicated in the table, and the facts exhibited in our notes," say the authors, "authorise these conclusions :—1. That the mean number of pulsations vary with the size, in such a manner, as that the pulsations diminish in proportion as the size increases, and *vice versa*.

"2. That the law of these variations is faithfully represented by the formula, $n'=n\sqrt{\frac{d}{d'}}$; d and d' representing two different sizes, and n and n' the numbers of pulsations corresponding to them.

"3. That the formula is also applicable to the variations of the pulse according to the age.

"To avoid all mistake," say the authors, "we ought to premise, that the formula is never applicable to an individual taken singly, in comparison with an individual of the same kind; it ought to be verified by the mean of observations obtained in sufficient numbers."†

* Comptes Rendus, 12th August 1839.

† Ib. 19th August 1839.

Remarks on Mr Blacklock's Treatise on Sheep. **By Mr William Hogg, Stobohope.**—About five weeks ago, a treatise on sheep was put into my hand, written by Mr Blacklock, surgeon in Dumfries. From a paper of mine which appeared in this Journal, No. 2. p. 175, 1828, this gentleman has taken sundry quotations which he either introduces or follows with dissatisfied remarks. To explain and vindicate the citations Mr Blacklock has selected, and the illustrations and explanations I affix to them, I designedly submit them to the judgment of practical storemasters and shepherds.

The paper from which Mr Blacklock extracts the erroneous sentences was, on the various appearances exhibited by a mongrel issue between a heath or short ewe and a Cheviot ram. When speaking of this mixed breed, my words are (p. 175), "Though the independent habits of the mountain flocks were lost, and a mongrel progeny of a clumsy figure occupied the lowest and warmest of the pastures; as they were improper subjects to breed from, they were often a drug in the market; but the storemaster had no other resource but to struggle on against the opposition which the animal itself made to the changes, and also against the influence of bad seasons, in order to get the influence of the Cheviot blood fully established." On which Mr Blacklock asks, "How did it happen, that the storemasters had no other resource but to persevere in an unprofitable course? Was he obliged to strive against natural obstacles, which even a short experience might have taught him were in that manner insurmountable? Why not recur at once to the old mode of management, rather than injure himself by kicking against the pricks?" On situations where the scheme misgave, or promised to turn out unprofitable or unsatisfactory, the storemaster did return both to his old breed, and, if any alteration had occurred in the management of this mongrel issue, to his former practice of arranging and sorting his sheep; but the restoration of his stocks to their former uniformity in shape, hardy peculiarities, &c. occupied more time than a determination to do so. The total extinction of the Cheviot blood in the ordinary course of management, was a tedious and disagreeable process, and if the stock was numerous through which it was disseminated, at the distance of ten or twelve years, marks of this connexion might still be in some individuals evidently discernible, and impurity of blood was, and still must be, a manifest defect.

Though setting a race of sheep free from all extraneous admixtures with strange breeds is not the work of a season or two, as theoretical men are apt to imagine, it is not like a rider entering upon a wrong road, a furlong or two, when he suspects his mistake, a slight tightening of the bridle-reins puts a stop to his error, and neither his horse nor the road he has to retravel will shew any marks of injury, or yet of his mistake; but one single transmission of Cheviot qualities through a numerous and formerly pure stock of heath or short ewes, and the impression will not be got rid of for many years. And though the descent should, after a lapse of years, perhaps by accident, be again disturbed with a connexion with another race, indications of a previous affinity with the Cheviot breed will be discernible in the progeny. I never knew this phenomenon occur in general among a stock of sheep; but I have noticed it among individual sheep which had access to a clandestine copulation.

The next quotation taken from my paper, which Mr Blacklock thinks faulty, runs thus (p. 177):—"Sundry storemasters were not aware that their old breed would so obstinately resist the impressions of the Cheviot blood, nor did they ever dream that the mongrel issue would be so easily subdued by the hardships and cold of winter: thus finding their scheme opposed at points where they anticipated little resistance, they gave up the experiment ere it was half completed, and introduced mountain rams to the mongrel issue." Mr Blacklock then adds, "enough has been said to prove, that this plan ought not to have been pursued," and he brings forward a magistrate and a minister to illustrate the inutility of this management; but what resemblance can be found between any of these gentlemen, and the case to which I refer in my paper, and that to which Mr Blacklock surely refers, I cannot comprehend. He supposes one of them "transported from the luxuriant plenty which surrounds him, to the meagre fare and churlish climate of our Highlands."

This simile may not inaptly represent a stock of ewes transferred all at once, and at all ages, from their native pastures to a more boisterous and alpine range; but there is no similarity whatever between the figure he here uses and a crop of mongrel lambs still retained on the same pastures, and destined to be occupants of it: a pasture of which their progenitors in the maternal line have been natives for ages, and on which they themselves are to be continued. He brings the above metaphor certainly for the sake of "appearance;" but with the incautious reader it is very apt to slide insensibly into a proof, that what he wishes to represent by it is really the truth. Finding the illustration incapable of being applied in every minute detail which the case requires, he descends to the offspring of these gentlemen, "Would their offspring" says he, "which, ten to one, would be prone to rapid growth, and therefore requiring at the least a large supply of porridge and milk, would they, I say, arrive at a healthy maturity, if supported only on oaten cakes and whangs of skim-milk cheese?" I observe, in passing, that the oaten cakes and whangs of cheese, with the other ordinary articles of diet in the Highland fare, are as well adapted for the complete development of the human person, and keep it in a firm healthy state, as the wheaten loaf, the sugared teas and jellies of the South; still, this illustration is inapplicable to the case, and Mr Blacklock is evidently in a mistake concerning the qualities of the Highland pastures. These celebrated regions raise an animal of a stronger bone and of greater animation than the southern pastoral districts of Scotland; but in the latter, the animal is often augmented in its size, improved in its figure, and quantity of its fleece, by its admission to grasses cultivated by the hand of man, which have been improved, and is now added to their ordinary range. To such juicy herbage, the Highland flocks have no access; even the soils of their extensive glens are not sweetened and reclaimed by burning heath, and draining marshy spots, as what the southern slopes are; but still the case is not fairly represented by the offspring of the magistrate. My paper, from which the blameable extracts are taken, all along refer to the reluctance with which a mongrel issue assumes the properties of the Cheviot race. This issue is brought up under the same temperature; while, *in utero*, it is nourished by juices of the same quality. When of age to gather its own sustenance, it crops the same herbage which its mother, as all the preceding ages of the stock, of which it is an integral part, have done; without there is no transfer or change from its predecessors. There is indeed an alteration both in its figure and wool, which it receives from its sire in the moment of impregnation; but to this alteration the soil on which it is reared contributes nothing, and the qualities of that pasture from which its male parent was originally taken, almost nothing; for the Cheviot ram destined for sale is so often transferred from one field of cultivated grasses to another, that every lineament of the original one is completely lost.

Another sentence in my paper which Mr Blacklock thinks to be erroneous, is this (p. 177):—"The constant and continued exertions of the two bloods,—the one endeavouring to overpower the other." He then adds, "There is no war waging in the progeny between the blood of sire and dam, the secret lies in the animal being unsuited for the pasture upon which it is produced." By the above sentence, I do not mean that there is an unceasing antipathy, a constant and active opposition between the bloods, after the subject in which they reside has acquired a distinct and independent existence; but I do think and maintain, that there is an incongruity in the first principles of the creature's formations, which seems an incomplete conception, and that this heterogeneity of first elements is the cause of that clumsy figure, that languid flow of spirits, which are always observable in a mongrel race, more especially in those circumstances where vigour and animation are required, in the same way as an ill-constructed or ill-proportioned machine makes bungling and insufficient work, particularly where speed and accuracy are necessary. When I speak of the imperfection of a mongrel race, it must be understood comparatively; and the standard by which its powers and produce are measured, should be the breed from which it is deduced, and which it succeeds on the same pasture, where they have the same herbage and are under the same temperature and treatment: if they are found inferior, either in general health, abilities, animation, or produce, to the breed which they succeed, and from which they are descended, they must be considered of less excellence and of less value.

The next error which Mr Blacklock detects in my paper is, my asserting that the Cheviot properties are most conspicuous in the smallest and feeblest of the progeny" (p. 178). "Do not suppose," says he, "as Mr Hogg strangely enough infers, that only the weak animals took on the Cheviot form, and only the strong ones assumed the Highland characters. The correct explanation is, that such as had most Cheviot blood were sure to become puny from being unadapted to the herbage on which those that resembled the mountain stock throve tolerably well." According to this theory of Mr Blacklock, pasture has an invincible power over the lamb long before it is born into the world. I think I have opened ewes that have died by accident at every period of gestation, and have always found the characters of one of the breeds fully and sufficiently marked, yet, much more apparent in some than others. This induces me to believe, that the germ of fecundation is no sooner communicated to the female, and the process of formation begun, than the representation of one of the breeds proceeds with the growth of the embryo; but what is the cause of this respective resemblance, perhaps never will be discovered. Certainly it cannot be the quality of the herbage, as Mr Blacklock erroneously imagines, I would rather consider the phenomenon as one of those mysteries which Nature in all her operations keeps to herself, and will for ever keep from human knowledge. All that we know about it is, that there is a cause for this particular likeness, and that the cause is far more powerful in some cases than others; but though the cause is unknown, the fact is certain. It is now more than forty years since I saw the issue of a very numerous stock of short ewes broken with Cheviot rams. During the lambing season, I had charge of part of them, and had every opportunity of noticing each successive cross of lambs, both in the state in which they were dropt, and in their subsequent alterations.* What was natural to expect, every accession of nature from the Cheviot ram upon the last crop, brought the immediate issue to a nearer resemblance to his peculiarities; yet, through the whole the above remark from my paper held invariably good, viz. that the strongest and coarsest woolled lambs resembled the maternal line, and the finest woolled, and seemingly the most delicate in their constitution, partook more of the Cheviot character. I may return to this subject.

---

* The experiment was begun on Chopehope and concluded on Minzion, the stock having been transformed from the one to other during the time of changing.

Fiars and Average Prices of Wheat for Eight Years: By Mr Bell of Hunthill.—I lately constructed a table, for a particular purpose, of the fiars prices of wheat in the several counties in Scotland, for the eight preceding years. In those in which more than one fiars price is struck, the average of all is stated; and at the foot of the column, the highest and the lowest prices in each year are shewn in lines; and in the last line, the difference is shewn betwixt these two.

Various deductions may be drawn from this table, some of them bearing upon the important question of the corn-laws, which will be still farther illustrated by the line shewing the general average price for all England in each of these years.

I shall only draw the attention of my readers to one point, which, so far as the tables go, is so far established, that in the six first years, when crops were good, and, of course, the seasons nearly of an average character, the fluctuations in the price of wheat in the various counties was comparatively small; but that in the two last years, the range is greatly increased; shewing forcibly, what might have been anticipated, the great influence of weather in harvest on fiars prices. Thus, in the six years 1832–37 inclusive, the greatest difference betwixt the fiars prices is 15s. 6d. in 1833, and the lowest is 9s. in 1832; but in 1838, the difference is 24s. 1d.; and in 1839, 40s. 2d. In this last year, 1839, therefore, two farms, each having 200 quarters of wheat to sell, the one farmer would receive L.655, while the other would receive only L.253 : 6 : 8, according to the fiars prices.

(For the Table see next page.)

FIARS PRICES of Wheat in Scotland for the last Eight Years, neglecting fractions.

Counties.	1832.		1833.		1834.		1835.		1836.		1837.		1838.		1839.	
	s.	d.	s.	d.	s.	d.	s.	d	s.	d	s.	d.	s.	d	s.	d.
Aberdeen, - - - -	50	0	44	0	39	0	30	9	47	0	48	0	0	0	60	0
Ayr, - - - - -	50	4	43	0	37	7	36	2	48	1	47	1	59	1	46	6
Banff, - - - - -	44	8	37	0	36	6	30	6	50	6	50	7	67	5	63	0
Berwick, - - -	46	2	44	5	36	8	34	0	49	2	49	4	69	4	48	4
Bute, - - - - -	48	9	45	0	38	8	37	5	42	8	49	11	55	7	0	0
Clackmannan, - -	50	6	45	3	39	0	35	3	46	8	47	0	63	7	42	0
Dumbarton, - -	51	1	47	9	39	9	36	5	48	6	48	8	58	11	45	6
Dumfries, - - -	52	0	48	10	40	10	38	0	52	10	52	8	61	6	47	2
Edinburgh (average), -	47	0	46	0	39	10	32	9	50	6	52	3	62	6	53	0
Elgin, - - - -	46	4	43	5	37	8	34	6	50	3	52	3	66	8	65	0
Fife (white wheat), -	48	8	46	10	39	1	29	6	44	7	47	8	64	8	38	11
Forfar, - - -	53	0	49	3	45	0	36	4	47	1	52	1	70	10	41	8
East Lothian (average),	50	4	52	6	42	3	36	2	52	10	52	7	72	4	62	4
Inverness, - - -	46	0	42	6	38	6	34	6	45	8	48	9	64	8	65	0
Kincardine, - -	51	0	47	3	44	1	36	8	52	9	50	0	70	0	53	5
Kinross, - - -	47	0	45	6	37	6	32	0	44	2	46	2	60	0	25	4
Kirkcudbright, - -	51	4	46	2	39	2	38	10	46	2	54	4	66	0	49	4
Lanak (average), -	48	5	45	1	38	3	36	3	46	5	44	4	48	8	48	7
Linlithgow, - -	49	4	48	0	38	8	35	3	47	5	52	0	66	8	47	5
Nairne, - - -	44	0	42	0	39	0	35	0	49	6	51	0	65	0	65	6
Peebles (average), -	50	0	44	9	32	10	33	4	51	7	52	10	48	3	55	3
Perth (average), - -	52	8	45	2	41	3	32	10	46	9	47	0	62	1	39	8
Renfrew, - - -	52	0	47	2	40	4	36	5	47	2	49	4	53	11	43	6
Ross, - - - -	46	2	39	1	38	1	31	10	39	2	46	6	54	7	65	9
Roxburgh, - - -	49	4	46	5	39	4	35	8	51	2	52	0	69	9	54	8
Selkirk, - - -	48	8	43	8	37	9	35	8	51	0	50	0	65	4	52	10
Stirling, - - -	50	0	46	0	38	8	36	0	45	4	47	0	64	6	39	8
Sutherland, - -	48	0	43	6	38	0	34	6	0	0	0	0	0	0	62	0
Wigton, - - -	48	0	43	4	36	8	34	8	50	2	46	4	58	4	48	0
Highest fiars-price in each column, - -	53	0	52	6	45	0	38	10	52	10	54	4	72	4	65	6
Lowest do. do. - -	44	0	37	0	32	10	29	6	39	2	44	4	48	3	25	4
Difference betwixt the highest and lowest, - - -	9	0	15	6	12	2	9	4	13	8	10	0	24	1	40	2
Aggregate average of all England, - -	44	0	57	7	46	7	38	11	47	5	56	2	63	2	71	0

MISCELLANEOUS NOTICES.

I. *Sheep, and their propensity to Fatten.*—Though breeding and feeding stock are intimately and collectively linked together, yet they are two different departments in the management of agriculture. The cautious and experienced storemaster, who breeds his stock to the pasture that is most conducive to their nature and strength of constitution, justly merits a distinguished degree among the most eminent agriculturists; for, by his skill and enterprise, he not only increases the value of his own property, but he is likewise enabled to sell to his more laborious neighbour, the cultivator of the soil, stock, which the feeder is enabled to bring to the same state of advantage, in regard to fat, in little more than half of the time it requires for stock whose improvement has either been neglected, or improperly managed; for they are not only deficient in weight, but require much longer time to fatten—this is in reference both to the Cheviot and black-faced. But, when we come to the crosses produced from the Leicester, their principal propensity is for feeding; indeed, they appear not to be adapted by nature for breeding, for they are generally found bad nurses; it is, therefore, vain to expect good stock from them.* In reference to this, I concede in the opinion, that the black-faced ewe is the most superior nurse. Along with this, it is likewise observable, when the Cheviot and black-faced ewe are crossed by the Leicester, during the time they carry the lamb, allowing both ewes to receive the same keep, even at this time nature's sympathy in nourishing the young appears more abundant in the black-faced than the Cheviot; for it will be found at the lambing season, that the black-faced will produce, if not stronger in bone, yet the most plump and heaviest lamb. The tendency to nourish their young accompanies them all the time they are giving suck. I had a proof of this a number of years since, upon a farm alike eminent for the richness of the soil and also for the stock it produced. There were kept, as a regular stock, about 600 Leicester ewes. One year there were bought in 500 Cheviot and black-faced ewes, and pastured on some coarse unimproved land through the winter. They got a few weeks turnips before lambing, and then were put upon young grass; and as a proof of the nourishing quality of the milk of the black-faced, their lambs, except a few of the younger kind, sold in the month of June for fat. The cross with the Cheviot, all that was marketable, were taken to St Boswell's market, the ewe and wether averaging 17s. 6d. The remainder of the two crosses, about 60, along with the dregs of the Leicester wether lambs, about 50, were put among the store hoggs, getting turnips from the middle of December until the end of March, and then put upon young grass for the summer. About the end of October they were put upon turnips, along with 120 three-year old halfling wethers, a cross from the Cheviot out of a black-faced ewe; they were bought for 27s. and were just arrived from the hills; and besides these, were 200 three-year old Cheviot wethers, bought at St Boswell's market for 28s 6d. carrying the fleece—these shared from that time the same advantage of pasture with the crosses, and were all put upon turnips together. Having the principal charge of examining them preparatory for the market, and having such a promiscuous mixture of different bloods, I felt an interest in the experiment. The result was as follows:—In the first week of January, all the Leicesters were sold for 52s. aged 21 months; in the first week of February, the halflings, except a very few, sold for 36s; about the middle of February, all the cross from the black-faced sold for 42s. aged 23 months; in the first or second week of March, all the cross from the Cheviot sold for 41s. aged 23 months; in the first or second week of April, the Cheviots were sold, averaging

---

* We cannot agree with this opinion.—EDITOR.

36s. 6d. aged four years. The cause of the halflings succeeding the Leicesters, I considered, was owing to their age. They are a profitable hardy kind of sheep, and ought to be bred wherever the situation and pasture will admit; they are not like the cross by the Leicesters, for they will accede to a farther improvement by a re-cross.*—Correspondent of the *Edinburgh Weekly Journal.*

II. *Cure of the Scab in Sheep.*—A recipe for dipping sheep I have used for twelve years, and found it answer very well. Take ½ lb. arsenic, ½ lb. sulphur, 2½ lb. soft soap, boil it in two gallons of water until it is dissolved. My method of brewing is this: I have an iron boiler holding thirty-five gallons, put in 8 lb. arsenic, 4 lb. soft soap, and 8 lb. sulphur, 32 gallons of soft water, and ½ lb. pearl ash; make them boil slowly for an hour, care must be taken, or the soap will boil over; when off the boil, put in the rest of the soft soap, and let it stand a night; when used, add twenty-four gallons of water to two gallons of the liquor, this is sufficient for nearly two score of lambs at Midsummer, and twenty-six hoggs in March. I always save the chamber-lye for a week or two, or run some strong wood-ash lees, and take care to dip after a washing, as the soap suds help to soften the wool, and add about six gallons to a score instead of water. The dipping is done by three men and two boys, viz.,—I have a vat 3 feet 6 inches long, 2 feet 10 inches wide, 1 foot 10 inches deep, made of 1½ inch deal plank, and a frame made somewhat like a harrow, braced at each end, and three pieces of leather nailed across the middle to receive the sheep, which yield to their shape. The sheep are penned up in some convenient place (a straw-yard is best), the boys tie their legs, my shepherd takes the head, and a man the hind legs, and dip them back downwards in the vat; when every part is wet except the face, they lift the sheep up, just high enough for the third man to slip the frame under which the sheep rests upon, they all three set to and squeeze the wool as dry as possible, untie its legs, and turn it off. They will dip from twelve to fifteen score in a day. Care must be taken not to let any of the liquor get into their mouths, as it will surely kill them. I keep a small flock of South-downs, and wean my lambs about Midsummer, and then dip both ewe and lamb. I graze the wether lambs off at fifteen months, dip the hoggs the beginning of March, taking care to have fine weather,—if cold, shelter them for a night or two. I seldom have a broken fleece. I never had the scab in my flock, and the wool-buyers praise the softness of my wool. This recipe, with only twenty gallons of half lees and water, and a little tobacco, will cure the scab. The expense is about 1s. 3d. per score for lambs, and 2s. for hoggs.—*Mark Lane Express.*

III. *Rohan Potato.*—We take the following notices of the Rohan potato from the American papers:—" This new and extraordinary variety, which has lately appeared in Switzerland, has been cultivated in this country two years; it surpasses all others in size and productiveness—is quite farinaceous, and of excellent flavour. Judge Buel, in the Cultivator of November last, says, "we obtained two tubers from France last fall, and through the kindness of an esteemed friend, we have been enabled to increase our seed 25 lb. We divided the tubers into sets of two eyes each, and planted one set in a hill four feet apart, in a piece of ground much shaded, and in rather low condition. We dug, weighed, and measured the crop on the 28th September. It weighed 525 lb., and measured 9 bushels, 35 of the largest tubers filling a basket. They are undoubtedly the most productive variety of potato we have ever met with. The three tubers first imported cost 45 dollars."

---

* On that very account they will be liker the Leicesters.—EDITOR.

"Dr Fuller, of the Connecticut Retreat, has gathered from one "true Rohan," presented him last spring, and which weighed only 4 oz., 96 lb. 5 oz., one of the potatoes weighed 2 lb. 10 oz., and the yield being four to one."

We copy the following from the columns of the New England Farmer:

"*Large Return from the Rohan Potato.*—Mr Ebenezer Stedman, of Newburyport, purchased of J. Breck and Co., at their agricultural warehouse, the last spring, 5 lb. of Rohan potato. He planted them in hills, four feet apart, three eyes in a hill; he thinks two would be enough. He states that from these he raised 525 lb. At 20 cents per lb., the present price, his crop is worth 105 dollars."

IV. *Vegetative Power of the Sea-Sand in Morecambe Bay.*—On Saturday the 6th of July, I again caused a quantity of sea-sand to be carted out of Morecambe Bay from a place below Chapel Island, opposite to Bardsea, about a mile from the Furness shore. This sea-sand had been, less than an hour previously, covered a considerable depth by the tide, and contained several cockles and other shell-fish common in the Bay; it was then immediately placed in pits or beds, 15 inches in depth, in my garden, and at once sown, without manure or admixture of any kind,—just, in fact, in the state it was when taken from the Bay—with wheat, barley, pease, mustard, cress, and the radish-seed. On Tuesday morning, the mustard, cress, and the radish-seed had sprouted. This morning, being Thursday morning, no more than five days from the formation of the beds of sand, I find the whole of the seeds have begun to vegetate; the mustard, cress, and radishes, having thrown out a considerable length of root, whilst (what is most extraordinary) the shell-fish are even yet quite alive! Thus have we wheat, barley, pease, mustard, cress, and radishes, all growing, and cockles and other shell-fish in a living state in one and the same bed of sea-sand! Should any one be at all incredulous as to the truth of this statement, he can easily try the experiment himself; an ordinary flower-pot filled with sea-sand taken out of the Bay, and sown with almost any kind of seeds, would at once put the matter to the test. I beg farther to add, that the common hay-seeds sown by me in October last, in beds of sea-sand similar to the above, and treated exactly in the same way, have now grown to the extraordinary height of 3 ft. 6½ inches

	Ft.	In.
Some wheat sown about Christmas last (now in ear),	3	9
Barley, ditto ditto ditto .	3	3
Peas sown about April (in full flower), . .	3	0
Peas sown about April last (pods completely formed),	3	2

J. S.

P.S.—The farmers all around the Bay of Morecambe, in forming composts for their wheat and barley crops, use of

Sea-sand about 26 carts (small one-horse carts),
Lime about 4 carts, . . . per statute acre.
Manure 10 carts, . .

Why use so great a quantity of sea-sand, if it does not possess very considerable vegetative power?

V. *Culture of the Carrot.*—All gardeners prefer that soil which is of a light, rich, loamy texture, dry and mellow. The soil he had to work was rather of a sandy nature to the depth of 2½ to 3 feet, which he found to answer well for the growth of carrots. He had the piece of ground intended for the crop trenched in the month of November, two and a half feet deep, laying at the bottom six inches of sea-weed, fresh as it was collected from the shore. When trenched, he strewed sea-weed six inches deep over the whole, the rain washing down the saline matter very much fertilized the soil. He then cited several crops, illustrative of sea-weeds' protective quality against frost, such as cauliflowers under hand-glasses, artichokes, and others, which were saved in the severe winter of 1837–38, when the same vegetables were entirely lost in all parts of that county. He raked off the sea-weed in the last week in March, added some good rotted dung from an old cucumber bed, dug it in one spit deep, breaking the clods well that the roots may run down long and straight. He prefers the drill system, as it presents a much neater appearance, and affords a better opportunity for cleaning and hoeing them deep, which is advantageous to all crops. It is advisable, previous to sowing, to have the seeds well rubbed between the hands and mixed with dry sand, to separate them, as they are apt to adhere to each other. He recommended that not only the carrot, but all garden-seeds, should be covered with leaf-mould; when so covered they vegetate much sooner, and are less liable to injury from the weather. Thinning to be performed with the hand, and in showery weather; if dry, water to be given frequently before thinning, and for so doing, the evening should be preferred. He would not point out any stated season for thinning, as young carrots are always found useful; but finally they should be left six inches apart in the row. A dry day, about the middle of October, to be preferred for taking them up, packing them in sand, in a dry shed. He recommended the Altringham as the best for a general crop. He was sure that the farmers in that part of the county would best consult their own interests if they cultivated the carrot more generally on that soil, which he believed was naturally best adapted for producing that crop, which is now becoming generally useful for feeding cattle. In confirmation of the benefit derived from the saline particles contained in the soil, he alluded to a scientific gentleman, Mr Kemp, who resides in that part of the country, and who brought into rich cultivation a great many acres of waste land, by his system of preparing *decomposed salt* as a manure, and which he used with great success in the cultivation of fruit trees and vegetables. His orchard was admired by all who saw it, both for its beauty and productiveness.—*From a paper by Mr O'Laughlin.*

VI. *Preservation of Timber.*—Dry-rot is a misnomer. This disease in timber ought to be designated a decomposition of wood by its own internal juices, which have become vitiated for want of a free circulation of air. If you place a piece of timber, newly cut down, in an upright position in the open air, it will last for ages. Put another piece of the same tree into a ship, or into a house where there is no access to the fresh air, and ere long it will be decomposed. But should you have painted the piece of wood which you placed in an upright position, it will not last long; because the paint having stopped up its pores, the incarcerated juices have become vitiated, and have caused the wood to rot. Nine times in ten the wood is painted too soon. The upright unpainted posts in the houses of our ancestors, though exposed to the heat of summer and the blasts of winter, have lasted for centuries; because the pores of the wood were not closed by any external application of tar and paint, and thus the juices had an opportunity of drying up gradually. If, then, you admit a free circulation of the air to the timber which is used in a house (no difficult matter), and abstain from painting that timber till it is perfectly seasoned, you will never suffer from what is called the dry-rot. And if the naval architect, by means of air-holes in the gunwale of a vessel (which might be closed in bad weather), could admit a free circulation of air to the timbers, and if he could also abstain from painting or doing with turpentine, &c., the outer parts of the vessel till the wood had become sufficiently seasoned, he would not have to complain of dry-rot. I am of opinion, that if a vessel were to make three or four voyages before it is painted or done with turpentine, &c., its outer wood would suffer much less from the influence of the weather than it usually suffers from its own internal juices, which cannot get vent on account of artificial applications to the pores. But still the timber would be subject to the depredation of the insect. To prevent this effectually, Mr Kyan's process must absolutely be adopted to secure wood from what is called dry-rot, in places where a free circulation of air cannot be introduced. The long arrows which the Indians use in Guiana, are very subject to be eaten by the worm. In 1812, I applied the solution of corrosive sublimate to a large quantity of these arrows. At this hour, they are perfectly sound, and shew no appearance that the worm has ever tried to feed upon it.—*Waterton's Essays on Natural History.*

VII. *Solar Influence.*—The genial and invigorating glow that moderate solar heat produces has ever been considered as tending to prolong our life. To enjoy this reviving influence the ancients had terraces on their house-tops, called *solaria*, in which, to use there, they took a solar air-bath; they fancied that when the sun rose, diseases declined. Aristotle records the case of an innkeeper of Tarentum, who, although able to attend to his business by day, became insane as soon as the sun had set. The moderns relate many similar instances of derangement, brought on by the absence of solar influence. Daily practice shows us that the paroxysms of fever and various maladies are under a similar influence; and the evening gun in our garrisons is often the signal of severe exacerbation in certain febrile cases, while the *reviellée* developes severe aggravation in others. Sydenham and Floyer had observed that the gout and asthma were usually ushered in after our first sleep; and I have noticed that, during the prevalence of the cholera, the invasion of this fatal disorder generally occurred towards day-break. It has been observed, in intermitting fevers, the paroxysms of the quotidian recur in the morning, the tertian at noon, and the quartan in the afternoon; in no instance do they occur at night. One of the most serious results of exposure to solar influence is the *ictus solis*, the *coup de soleil* of the French. This attack is, in general, sudden, and the patient falls down as if struck with a blow on the head. Troops on a march, and labourers in the field, frequently are the victims of this solar power. On a hot day's march in Portugal I lost six men in a brigade under my charge. A great number of greyhounds perished on the same march, but no other species of dog, although we had many pointers and spaniels with us. Horses, mules, and cattle were also exempt from the attack, though it proved fatal to some weak donkeys who were following the troops.—*J. G. Millingen, M.D.*

VIII. *Sowing Wheat after being Kiln-dried.*—It may not be generally known to our agricultural readers, that the vegetative powers of wheat are greatly increased by its being kiln-dried previously to being sown. A friend of ours, an extensive farmer in this district, in the month of October last, thrashed out a quantity of wheat from the stook the day after it was cut, but finding it too damp to be used as seed, was induced to dry it in the kiln. A field of considerable extent was sown with the grain so prepared, with the exception of two ridges on each side, which were sown a few days afterwards with wheat, after it had remained a full week in the stook and been properly *win.* The idea of sowing wheat after it had been kiln-dried was treated as absurd and ridiculous by several of his neighbours, and an eminent and extensive agriculturist asked him if he was so plenty of wheat that he meant to sow his ground a second time. Notwithstanding this unfavourable opinion, the farmer persevered and sowed several bushels more, until he had twenty acres completed. Experience is the surest test of any improvement, and in this instance our friend has had his hopes more than realized. It is a remarkable fact that the wheat thus prepared, by being dried on the kiln, has not only brairded more thickly, but is much stronger and healthier in appearance than that which sprung from the wheat dried by the operation of the elements.—*Kelso Chronicle.*

IX. *Parsley.*—In the hieroglyphic language of flowers, the gift of parsley implies a wish of the person's death to whom it is presented; for parsley has ever been the herb with which the Greeks decorate their graves and tombs; and hence to want parsley was an expression applied to a person in his last extremity.

QUARTERLY AGRICULTURAL REPORT.

August 1840.

Very soon after the date of our last Report—that is in the second week of June,—the fine weather left us, and was succeeded by rain for several successive weeks, until the middle of July, since which it became again drier, with occasional showers, sunny days, and warm temperature, though neither so dry, or sunny, or warm as the weather in spring. Nevertheless, the weather has been very encouraging to vegetation; mild, throughout the day and even in the night; the thermometer seldom falling under 50° in the night, and rising above 65° in the shade during the day; and occasional showers and even rainy days, with frequent gleams of sunshine, not overpowering. The rain, after it began to fall in June, continued to increase until the end of the month, and assumed a rather threatening aspect, not unlike to the fall of the last year for some days; still, the temperature continued high, and the fall of rain was occasionally broken by gleams of sunshine, which, while it promoted the growth of the straw, tended to impart a stiffness to it; the consequence of which has been, that very little of this crop has been laid. Contrary to the feeling created last year by the rain, that the weather would not improve in time to benefit the crop materially—and which was unhappily verified too nearly to the letter,—there was a strong assurance of hope this year during the rain, that the weather would soon clear up, and be favourable to every kind of crop; and this anticipation, we are happy to say, has not been disappointed.

The autumnal wheat has continued thinner on the ground than might have been wished. Rather too much of rain has caused it, in some instances, to be much rusted in the straw. The blooming season, however, was well got over; and as a crop, upon the whole, when compared to that of last year, it will be much superior in quality, greater in quantity, and earlier harvested. The wheat harvest is carrying on with spirit in England; in the south it is about over, and in other parts it is well advanced. Both the oats and barley are thick enough on the ground, with the exception of the latter on thin poor clay soils, and promise abundant returns. Some of both have already been cut in the neighbourhood of Edinburgh. There will be no general harvest until the middle of September; and even after that in the higher districts. This is greatly to be ascribed to the want of sunshine, which, although appearing occasionally, is not of sufficiently long endurance at a time, nor powerful enough to harden the grain and whiten the straw in a short time. Harvest wages are generally so equal in most seasons, that the subject does not admit of remark; but it is gratifying to state, that no want of field-labour has been felt by the labouring population, in consequence of the spirit with which thorough-draining is everywhere prosecuted, and the formation of railways. The hay-crop has turned out a better one than anticipated; but from the great breadth of oats sown, and the appearance of the straw, it is not expected that hay will exceed 7d. or 9d. per stone of 22 lb. In most instances the hay is deficient of clover. The pastures have presented a profusion of white clover this season, such as we have not observed for many years. The stock have consequently had a full bite since the middle of June; but the rain has prevented them feeding fast; and, indeed, it is seldom until this date that the grass has much strength for feeding. Stock of all kinds, especially lean, fetch high prices, and butcher-meat, in consequence, is still dear, 7d. per lb. being the current price of good meat. Wool, however, has fallen considerably in price, 6s. per stone of 24 lb. on the best kinds, in consequence, no doubt, of the comparative stagnation of the woollen trade with America; but, notwithstanding of this untoward circumstance, the lambs have been fetching prices at the great fairs such as have not been obtained for years, which indicates a supply of meat below the actual demand for it.

The potatoes are not such a crop this year as might be wished, there being considerable blanks amongst them in many places; and in others, the stems are very puny. This is especially the case on clay soils. The weather and ground in spring were very dry, when the greater part of the crop was planted. Those who delayed planting found the ground in a better state for that operation; but the rain that followed may have injured even the later planted. It would be an important fact to ascertain whether the failures have occurred most amongst those which were planted in the dry weather or in the moist? If among the former, the circumstance would go far to strengthen the opinion of the existence of the degenerate state of the tuber which is unable to withstand the desiccating power of a dry soil; and if among the latter, we may conclude too much rain had fallen, and had rotted the tuber-sets. We suspect that the drought had done much more mischief than the moisture, as the rain was never at any time very heavy or of long continuance. The early turnips brairded well, and grew pretty rapidly. Those who sowed Swedes early got away their crop before the rain could prevent the working of the ground in the early stage of their growth; and the consequence is, that they promise a very fine crop, their appearance being fully better at this date than for some years past. The white turnips were, in many instances, very late of being thinned, and too long of being so, in consequence of the damp and clammy state of the soil, especially on strong and thin soils on retentive bottoms. However, as the weather ever since it became drier has proved highly favourable to vegetation, we have no doubt they will all yet become a good crop. The bare fallows have been got well worked of late, and in many cases the seed-furrow has been made up. Upon the whole, the prospects of the farmers in Scotland are much better than they were at the same date last year. Not only for their sakes, but even more so for the sake of the labouring poor, who have, beyond doubt, suffered much privation for two years in consequence of the dearness of corn, and of every other article of consumption which rises in value in its train, that the crop, which now stands on the ground with so much promise of production, will be well got in and prove abundant.

There has been a gradual importation of foreign corn, chiefly of wheat, during this season, to the amount of 860,853 quarters, of which have paid duty 482,410 quarters, whilst there remain in bond 1,300,354 quarters. The price of wheat has risen for some weeks past, partly because farmers are holding their inferior samples of last year, until they become mill-free, and which causes a shortness of supply in the market, but chiefly, we suspect, that the foreign wheat may be entered for home consumption at a low duty before much of the new crop finds its way into the market. The duty is only 6s. 8d. per quarter. On comparing the prices of wheat of last and this year, they are very nearly the same. On Friday, August 14. 1840, the weekly average of all England was 72s. 10d. per quarter, that on Friday, August 16. 1839, was 72s.

We observe that the Central Society of England has dissolved itself, and given over all its papers and funds to the Society for the Protection of Agriculture, which has been instituted, under the presidency of the Duke of Buckingham and Chandos, to counteract any effect the anti-corn-law league may have made upon the mind of the country. We hope the society will contribute liberally in order to oppose that league after its own fashion of paying eminent writers and persuasive speakers, to explain to the thinking portion of the community the grounds upon which the agriculturists stand in favour of a corn-law, and to demonstrate to them the necessity of protecting our home agriculture against the competition of foreign agriculturists, who have comparatively no taxes to pay, or expensive establishments to support. We are quite persuaded that all the facts made known in the public documents which have been published by authority of Parliament, and all the arguments founded on these, go to support the views of the agriculturists, and that were the repealers of the corn laws as desirous of upholding the truth as evolved in these documents, as they are strenuous in merely exciting the passions of the people, they would themselves arrive at the same conclusion. Let the question of the necessity of a corn-law be discussed ever so often, and with all openness and candour, and we are persuaded the people will soon discover that the repealers are deluding them for the mere selfish purpose of injuring the interest of agriculturists to the improvement of their own; and even the probability of their condition being improved by the ruin of our agriculture, is a gross assumption on their part, and cannot be sustained by a reference to inferential facts. The more, therefore, the question of the necessity of a corn-law to protect our agriculture from foreign competition is discussed, the more, we are convinced, will that necessity be made apparent. Let the Protection Society, therefore, use every means to enlighten the people, and especially those in towns, by the facts and arguments that may easily be brought to bear upon and support that view, and they may then bid defiance to all the sophistries of the repealers to poison the public mind with their politico-economical dogmas.

The Royal English Agricultural Society held their annual meeting at Cambridge on the 15th July last. The number of members mustered on the occasion was very great, and they were countenanced by thousands of the people from the provinces. The sum collected at the gate of the show-yard was L.1650, which, at 2s. 6d. each person, would indicate the presence of about 13,000 persons. The great dinner was held in the quadrangle of Downing College, covered in by an awning, and attended by nearly 3000 persons. The rapidity with which the society has risen in public favour may be estimated by the fact of its having enrolled among its members no less a number than 2800 in two years. We do not know that the stock exhibited was either very numerous or very fine: private accounts say that the show was by no means so fine as it should have been, or could have been, in England. Many breeders who have acquired a name are afraid of losing it by coming into competition with others, and this may in some measure account for the absence of the finest stock in the country; but if this is really the cause of the absence of the finest stock from these shows, the directors should endeavour to overcome the feeling by some judicious arrangements, and after it has been fairly overcome, there is no doubt breeders would compete against each other ever after with great spirit. If this end were accomplished, we would hear of fewer personal challenges for competitions, which arise entirely from an overweening partiality for the challengers' own stock. The Messrs Ransome of Ipswich shewed no fewer than 81 varieties of ploughs.

THE REVENUE.

ABSTRACT of the Nett Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of July 1839, *and 5th of July* 1840,—*shewing the Increase and Decrease on each head thereof.*

	Quarters ended July 5.		[illegible]	[illegible]	Years ended July 5.		Increase.	Decrease.
	1839	1840			[illegible]	[illegible]		
	£	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	£	£
Customs, - -	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	. .
Excise, - -	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	. .
Stamps, - -	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	114,249	. .
Taxes, -	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	. .	7,093
Post O	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	. .	[illegible]
Mi	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	. .	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]							692,071	
[illegible] Year,							[illegible]	

TABLES OF PRICES, &c.

The Average Prices of the different kinds of GRAIN, per Imperial Quarter, sold at the following Markets:—

LONDON.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
May 1.	70 10	41 10	25 8	37 6	42 0	40 11
8.	70 1	39 5	27 0	36 10	41 6	41 6
15.	72 2	41 7	27 10	37 4	41 2	43 0
22.	70 11	40 2	27 2	37 2	42 2	43 1
29.	70 3	39 1	27 4	37 6	41 8	43 10
June 5.	67 6	36 5	27 8	38 6	42 6	44 3
12.	72 0	36 6	27 9	39 6	43 6	44 1
19.	71 9	37 4	28 9	38 6	44 5	44 0
26.	72 5	36 2	27 9	37 4	44 0	45 2
July 3.	73 11	38 10	27 10	36 6	43 9	44 8
10.	74 6	36 9	28 10	35 8	44 2	44 6
17.	75 8	33 1	28 6	36 4	44 10	46 0
24.	79 4	31 2	28 5	36 0	45 6	45 10
31.	80 5	30 7	28 6	36 8	46 0	46 7

DUBLIN.

Date.	Wheat per Bar. 20 St.	Barley per Bar. 16 St.	Bear per Bar. 17 St.	Oats per Bar. 14 St.	Flour per Bar 9 St.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.
May 1.	36 9	18 3	14 6	16 4	22 10½
8.	36 10	18 2	14 2	17 1	22 6½
15.	36 9	17 11	14 0	17 5	23 2
22.	36 6	17 10	13 10	17 6	22 11½
29.	36 7	17 8	13 6	17 11	23 3½
June 5.	36 5	17 9	13 4	17 8	22 11
12.	35 10	17 6	13 2	17 10	23 2½
19.	35 11	17 10	13 6	17 8	23 8
26.	36 3	18 5	13 9	17 9	22 8½
July 3.	36 5	18 6	14 1	18 0	22 7½
10.	36 9	19 6	14 4	18 6	22 9
17.	37 3	19 4	14 6	18 7	23 3½
24.	38 0	20 6	14 10	19 3	23 4½
31.	38 5	20 9	15 2	19 1	23 8½

LIVERPOOL.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
May 1.	60 9	40 6	26 6	37 6	42 6	45 0
8.	64 4	44 4	27 2	37 4	44 6	47 6
15.	56 6	40 7	28 0	37 4	45 2	46 10
22.	56 4	37 6	27 10	37 2	46 8	48 8
29.	52 7	34 9	27 4	36 6	45 0	47 10
June 5.	48 6	36 0	27 9	36 2	46 4	48 9
12.	51 8	33 4	27 1	35 6	46 6	48 6
19.	62 9	38 11	28 7	36 4	45 9	48 0
26.	66 2	38 0	27 10	36 8	45 4	47 2
July 3.	56 8	35 0	26 8	36 10	45 0	47 0
10.	64 2	35 8	28 3	36 2	44 9	46 9
17.	69 4	37 2	27 10	35 9	45 4	48 3
24.	70 5	35 6	26 6	36 0	45 6	48 0
31.	72 0	36 0	29 1	35 8	46 0	49 0

EDINBURGH.

Date.	Wheat.	Barley	Oats.	Pease.	Beans.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.
May 6.	66 9	34 6	28 9	42 6	43 0
13.	65 9	34 4	28 10	42 0	42 8
20.	63 9	34 2	28 6	42 2	42 9
27.	64 8	34 0	29 8	43 6	43 10
June 3.	65 5	34 6	30 2	43 0	43 9
10.	65 6	34 9	30 10	43 0	43 8
17.	66 2	35 0	31 6	46 0	46 8
24.	66 9	35 2	31 6	46 0	46 2
July 1.	66 10	35 0	31 4	45 9	46 3
8.	66 9	35 0	31 6	45 6	48 2
15.	67 6	34 5	32 0	46 6	47 1
22.	70 6	38 0	34 0	46 0	46 10
29.	71 6	38 2	34 1	46 0	46 2
Aug. 5.	72 0	38 6	36 6	47 0	47 6

TABLE showing the Weekly Average Prices of GRAIN, made up in terms of 7th and 8th Geo. IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIGN CORN the Duties payable thereon, from May to August 1840.

Date.	Wheat.			Barley.			Oats.			Rye.			Pease.			Beans.		
	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
May 1.	68 5	68 10	16 8	39 8	40 0	1 10	25 11	25 7	9 3	37 6	37 3	14 0	42 0	41 4	8 0	42 4	42 0	6 6
8.	68 1	68 8	16 8	38 6	39 9	3 4	26 10	25 8	9 3	36 9	37 4	14 0	41 6	41 6	8 0	43 11	42 6	6 6
15.	68 7	68 8	16 8	38 5	39 6	3 4	27 6	26 0	7 9	37 2	37 4	14 0	41 7	41 7	8 0	44 2	42 11	6 6
22.	68 0	68 6	16 8	37 3	39 1	3 4	27 8	26 4	7 9	37 2	37 4	14 0	42 5	41 10	8 0	44 10	43 6	5 0
29.	67 10	68 3	16 8	37 0	38 5	4 10	27 1	26 8	7 9	37 3	37 2	14 0	41 11	41 11	8 0	44 6	43 10	5 0
June 5	67 1	68 0	16 8	36 4	37 10	6 4	27 10	27 1	6 3	39 3	37 6	14 0	43 7	42 2	6 6	45 4	44 8	3 6
12.	67 7	67 10	18 8	35 9	37 3	6 4	27 6	27 4	6 3	37 1	37 5	14 0	44 6	42 7	6 6	45 1	44 8	3 6
19.	67 4	67 9	18 8	35 10	36 9	7 10	28 4	27 7	6 3	36 8	37 6	14 0	43 1	42 10	6 6	45 0	44 10	3 6
26.	67 8	67 7	18 8	35 5	36 3	7 10	27 11	27 8	6 3	37 3	37 5	14 0	45 6	43 6	5 0	45 3	45 0	2 0
July 3.	67 8	67 7	18 8	36 1	36 1	7 10	27 10	27 9	6 3	34 9	37 1	14 0	43 11	43 9	5 0	45 4	45 1	2 0
10.	68 6	67 8	18 8	34 8	35 8	9 4	28 5	28 0	4 9	35 8	36 9	15 6	44 10	44 3	3 6	45 8	45 3	2 0
17.	69 6	68 1	16 8	33 11	35 3	9 4	28 2	28 0	4 9	36 0	36 2	15 6	46 1	44 8	3 6	46 1	45 5	2 0
24.	71 4	68 8	16 8	32 8	34 9	10 10	28 10	28 3	4 9	36 8	36 1	15 6	45 6	44 10	3 6	45 11	45 6	2 0
31.	71 11	69 5	13 8	33 8	34 5	10 10	29 6	28 5	4 9	35 11	36 0	15 6	46 0	45 4	2 0	46 1	45 8	2 0

The MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, ***shewing the Quantities of Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantities upon which duties have been paid for home-consumption, during the same Month; and the Quantities remaining in Warehouse at the close thereof, from 5th May* 1840 *to 5th July* 1840.**

Month ending	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
May 5. 1840.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu	Qrs. [illegible]
Wheat, . .	229,755 5	0 6	229,756 3	112,476 5	0 6	112,477 5	377,702 2	161 4	377,86[illegible]
Barley, . .	149,301 7	. .	149,301 7	139,608 5	. .	139,608 5	18,376 7	. .	18,37[illegible]
Oats, . . .	24,344 4	. .	24,344 4	1,775 1	. .	1,775 1	38,965 3	. .	38,96[illegible]
Rye, ...	. .	. .	. .	116 4	. .	116 4	1,948 4	. .	1,94[illegible]
Pease, . . .	8,240 7	. .	8,240 7	2,833 4	. .	2,833 4	10,498 3	. .	10,[illegible]
Beans, . .	12,856 6	. .	12,856 6	2,760 0	. .	2,760 0	17,636 7	. .	17,6[illegible]
Totals,	424,499 5	0 6	424,500 3	259,570 3	0 6	259,571 1	465,128 2	161 4	465,2[illegible]
June 5.									
Wheat, . .	346,473 4	0 2	346,473 6	321,506 3	32 2	321,538 5	396,517 3	129 3	39[illegible]
Barley, . .	126,258 0	. .	126,258 0	143,936 7	. .	143,936 7	2,045 7	. .	2,04[illegible]
Oats, . . .	26,478 6	. .	26,478 6	623 2	. .	623 2	62,471 5	. .	62,471
Rye, ...	624 7	. .	624 7	60 0	. .	60 0	2,386 3	. .	2,3[illegible]
Pease, . . .	13,363 3	. .	13,363 3	3,292 0	. .	3,292 0	21,309 4	. .	21,[illegible]
Beans, . . .	11,320 2	. .	11,320 2	1,029 7	. .	1,029 7	28,403 5	. .	28,40[illegible]
Totals,	524,518 6	0 2	524,519 0	470,448 4	32 2	470,480 5	513,134 3	129 3	513,26[illegible]
July 5.									
Wheat, . .	284,623 7	. .	284,623 7	148,427 6	11 4	148,439 2	526,184 7	118 0	526,[illegible]
Barley, . .	51,756 6	. .	51,756 6	41,960 7	. .	41,960 7	10,174 7	. .	10,174
Oats, . . .	51,724 0	. .	51,724 0	29,376 7	. .	29,376 7	81,303 5	. .	81,[illegible]
Rye, ...	1,252 3	. .	1,252 3	136 4	. .	136 4	3,345 5	. .	3,[illegible]
Pease, . . .	13,620 2	0 3	13,620 5	5,381 2	0 3	5,381 5	28,251 6	. .	28,[illegible]
Beans, . .	18,012 3	. .	18,012 3	7,853 3	. .	7,853 3	36,799 0	. .	[illegible]
Totals,	420,989 5	0 3	420,990 0	283,136 5	11 7	283,148 4	686,009 6	118 0	686,127
May 5. 1840.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb	cwt. qr. lb.	cwt. qr. lb.	cwt. [illegible]
Flour, . . .	97,292 2 26	4,425 2 2	101,718 1 0	88,871 3 26	4,425 2 2	93,297 2 0	246,801 2 24	4,652 2 27	251,454 [illegible]
Oatmeal, .	. .	. .	. .	. .	. .	. .	48 0 4	. .	48 [illegible]
Totals,	97,292 2 26	4,425 2 2	101,718 1 0	88,871 3 26	4,425 2 2	93,297 2 0	246,849 3 0	4,652 2 27	251,[illegible]
June 5.									
Flour, . . .	206,613 0 2	877 2 12	207,490 2 14	286,309 1 0	877 2 12	287,186 3 12	146,506 2 22	73 2 14	146,580 1 [illegible]
Oatmeal, .	13 0 0	. .	13 0 0	.	. .	. .	61 0 4	. .	61 [illegible]
Totals,	206,626 0 2	877 2 12	207,503 2 14	286,309 1 0	877 2 12	287,186 3 12	146,567 2 26	73 2 14	146,641 1 [illegible]
July 5.									
Flour, . . .	97,933 1 12	15,162 0 7	113,095 1 19	85,641 1 3	15,172 2 16	100,813 3 19	132,445 3 2	63 0 5	132,50[illegible]
Oatmeal, .	25 1 12	442 3 3	468 0 15	. .	442 3 3	442 3 3	37 0 15	. .	37 0 [illegible]
Totals,	97,958 2 24	15,604 3 10	113,563 2 6	85,641 1 3	15,615 1 19	101,256 2 22	132,482 3 17	63 0 5	132,54[illegible]

PRICES of BUTCHER-MEAT.

	SMITHFIELD, *Per Stone of* 14 lb.		MORPETH, *Per Stone of* 14 lb.		EDINBURGH, *Per Stone of* 14 lb.		GLASGOW, *Per Stone of* 14 lb.	
Date.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
1840.								
May	7/6 to 8/	6/9 to 7/9	7/3 to 7/9	6/6 to 7/6	6/ to 7/6	6/ to 7/3	6/3 to 7/6	6/6 to 7/6
June	7/3 7/9	6/6 7/6	7/3 7/6	6/9 7/6	6/3 7/6	6/6 7/6	6/9 7/9	6/3 7/3
July	7/6 8/	7/ 8/	7/6 7/9	7/ 7/9	6/6 7/9	6/9 7/9	6/6 7/6	6/6 7/9

PRICES of English and Scotch WOOL.

English, per 14 lb.

Merino, ...	22/	to 24/
In Grease, ...	18/	21/6
South Down, ...	19/	23/
Leicester, Hogg, ...	14/	18/
Ewe and Hogg, . . .	11/6	14/6
Locks, ...	7/	8/6
Moor, ...	6/6	7/6

Scotch, per 14 lb.

Leicester, Hogg, . .	14/	to 18/6
Ewe and Hogg, ...	12/	16/
Cheviot, white, ...	13/	15/6
Laid, washed, . . .	8/	13/6
Unwashed, . . .	6/6	8/
Moor, white, ...	4/6	6/
Laid, washed, ...	3/6	5/
Unwashed .	3/	4/

THE

QUARTERLY

JOURNAL OF AGRICULTURE.

ON THE ADVANTAGES OF A GOVERNMENT GRANT FOR EMIGRATION FROM THE HIGHLANDS AND ISLANDS OF SCOTLAND.

By Mr Alexander Macgregor, Licentiate of the Church of Scotland,
Manse of Kilmuir, Skye.

For some years back the condition of the Highlands and Islands of Scotland has deservedly arrested the attention of many of the great and good in the United Kingdom. When a general destitution of the necessaries of life at a late period threatened to commit fearful ravages in almost every Highland district and parish, exertions were made to afford immediate relief, which will ever reflect unbounded credit on the nation's philanthropy! It is true that the Highlanders are a race of people renowned for their many warlike deeds and native virtues. It is well known that their achievements in all quarters of the world have been of no ordinary kind, and that their heroism and loyalty have become almost proverbial. Yet, after all, that debt of gratitude which they owe to their benefactors in general can never be forgotten, and those grateful acknowledgments which are due to the honourable gentlemen, who did all in their power to arouse the nation's sympathy in their behalf, will ever be thankfully tendered. Truly sad and distressing were the hardships which the Highlanders underwent in the years 1836 and 1837, when the failure of the crops in those seasons overwhelmed their country with a general famine. But from these they were humanely and liberally rescued, by movements made in their behalf, which never had, and probably never will have, a parallel. It is much to be regretted that the condition of this loyal race of people is not sufficient to secure them in future from the sad effects of a similar calamity, should such, in the course of providence, come to pass. Such is not the case, for the very causes from which their late sufferings took their origin are still operating with unabated effect. These are an excess of population, together with the manifold evils which flow therefrom. In an essay published in No. XLII of this Journal, the remote causes which led to the late destitution were stated to be, *an excess of population, early and improvident marriages, the lotting system, and bad husbandry.* These are the causes which operate, as it were, in concert against the Highlander's welfare, and until they be removed by judicious local and legislative enactments, the people in question will ever be liable to their sad effects! An excess of population presently exists in almost every Highland district, and until that excess be done away with, by a government grant of money for that purpose, the Highlanders are as liable as ever to become the victims of similar calamities in future. An extensive system of emigration, conducted on approved principles, is the only mode of relieving the Highlands and Islands of their redundant population; and until that be effected every other remedy will prove to be merely of a transient and temporary description.

It is humbly intended by the following remarks to set the real circumstances and condition of the lately distressed districts in a clear light—to state every thing with regard to the inherent means and capacities of the people—and to shew their utter inability to raise themselves by their own exertions from the grades of poverty in which they are haplessly placed.

During the late years of destitution, the Highlanders were in every respect unfitted, and, if it may be so expressed, quite unprepared for such a calamity as then visited the habitations of the destitute. The population, by being under no restrictions, had accumulated to an enormous amount! Most of the farms which were originally formed into allotments of a desirable extent, had been broken down into shreds and patches for the accommodation of the increasing population; and the soil had been weakened and rendered unproductive by continued cultivation. Pauperism was thus gradually making inroads, and speedily gaining ground among the people! Destitution had in numberless instances commenced to shew itself; but the Highlander's pride and sense of honour enabled him to endure in private the hardships and distresses of indigence, before it came to the knowledge of his next-door neighbour that such was the case. The calamity, therefore, which was so general in the above-mentioned years was merely the result of an improvident system of management in regard to the population. The fall in the price of cattle—the cessation of kelp manufacture—the failure of the herring fisheries—the want of public employment, and other external causes, only tended to increase the evil effects which had their origin at an earlier period: while a general failure of the crops in the years referred to above, brought the matter to a sudden crisis, and overwhelmed the population with a general want of the necessaries of life. To the sudden increase of population, therefore, are attributable all the hardships which the Highlanders have of late years endured, and the only remedy which can be successfully applied, is to reduce the population by prudent measures at the national expense.

While it has been mentioned that emigration must be resorted to with a view to effect the necessary remedy, it is well known that this proposition is met in the very outset, by some theorists who declaim against it, and endeavour to prove that emigration tends to no advantage, because the places vacated would instantly be occupied by new aspirants, who would soon raise the population to its original over-grown amount, and that thus the evil would be as great as ever, after expending much of the public revenue to no purpose. It is true, that, if no preventive regulations were enforced, such would be the result. It is true, if the crofts and half crofts, small lots and fragments of land left by the emigrants, were given without reserve to any applicant, whose imprudent offers in the shape of rents were highest, that the same would be speedily occupied by new tenants,—nay, by improvident young men,—bonnetless youths of eighteen or twenty years of age, who would, equally destitute of pence and prudence, enter into the matrimonial state, and thus give, as it were, a new impetus to the undue increase of population! But let this be prevented. While every community must be subjected to the influence of salutary enactments, there is neither hardship nor injustice in the enforcement of prudent regulations on every property, to prevent the recurrence of such reckless habits of increasing the population. What could be more easy or salutary than to impose an absolute veto on such proceedings? Let the possessions, however small, of such as have emigrated, be given, not to juvenile applicants, but to the adjoining crofter, until his possessions be increased to a reasonable extent; and thus the lotting system will soon be annihilated,—the young aspirants will betake themselves to other resources,—and emigration will effect its benefits with the most desirable advantage and success.

Such checking processes are no theory, or vague supposition, as the benefits which flow from them are evinced by actual proof, at this very time, to that extent which circumstances will admit of, on Lord Macdonald's property in the Isle of Skye. From some of the parishes several hundreds have voluntarily emigrated, during the last few years, to America; and from other parishes numbers have been conveyed to Australia. But in place of giving either the houses or possessions of such as have thus emigrated to new applicants, the former have been thrown down, and the latter have been added to the possessions of the adjacent tenants, and in this manner the allotments of land are gradually enlarged,—the multiplication of families checked,—and improvident marriages entirely prevented!

A government grant for emigration is essentially requisite to ameliorate the present condition of the Highlands and Islands, because the distressed districts therein have no inherent power to remedy themselves effectually. The evils to which they are subjected arise from a redundant population, and the effects of that redundancy are already such as wholly incapacitate the community from procuring the necessary remedy from their own resources. What the distressed districts, therefore, are unable to provide themselves with, must be provided for them; otherwise, the evils already in existence, and too far advanced, must continue in existence without any future prospect of a remedy! It is unquestionably the province of government to reduce the superabundant population, by a judiciously organized system of emigration, and thus to lay open the physical resources of the country in such a way as that new regulations, and new processes of arrangement, may eventually check for the future, an undue increase of population. When this is once accomplished, it then becomes the province of every Highland proprietor to adopt that system of management which is best calculated to give effect to the government boon in reducing the population, and to form a class of tenantry which will earn a livelihood with comparative comfort to themselves, and in a manner which must afford much satisfaction to their landlords.

It has just been stated that the distressed districts in the Highlands and Islands have no inherent power to remedy themselves effectually. Although this is a fact, plain and palpable to all who have an intimate knowledge of the condition and circumstances of the inhabitants of the said districts, yet it has been disputed by certain theorists, distinguished alike for their zeal and erudition, who lay it broadly down, "that there is no possible help for the labouring classes, if they will not help themselves; that it is to a rise and reformation in the habits of our peasantry that we must look for deliverance, and not to the impotent crudities of a speculative legislation." These maintain that the peasantry can never be amended in their external circumstances, but from their own inherent energies; and that it is idle to seek, in legislative enactments, in emigration, or in any such devices, for that real and permanent improvement, which can originate only in the diffusion of sound christian education! However well such theories may sound in words, it is humbly asserted that they are at direct issue with facts. Education is stated to be the sole requisite for the people's advancement in every wished-for comfort. While the superior importance of education is freely admitted, yet in this case it is invested with an omnipotence which can never be realized by facts. But, granting that education had all the advantages maintained, it is impossible for it to shew its happy effects where it cannot exist! It is well known that where extreme poverty reigns—where the sole attention of every toiling family is placed on the means of obtaining, from day to day, a scanty support,—where the mind is wholly absorbed in the pursuit of those necessaries which are indispensable to keep the household in life,—there is no desire for education. The gripe of poverty precludes every wish for this purpose! The attention, the mind with all its energies, are otherwise directed, and education is thus wholly neglected. Should teachers be multiplied in every desirable abundance, and should their best services be bestowed gratuitously, yet the children whose parents are harassed with abject poverty, cannot avail themselves of the very advantages which are otherwise within their reach. They cannot even appear in school for want of clothes, of books, and of other necessaries; and, while they are in such circumstances, the blessings of education are to them entirely lost! But should this not be the case, and should the children of the poor in remote Highland districts be blessed with instruction in the arts of reading, writing, and arithmetic, what are these to avail them, in a temporary point of view, while they are to continue located in vast numbers in those districts which are inadequate for their support? They have not the means to remove even to other parts of the kingdom in such numbers as to afford any relief to the over-populated districts of their birth! Education, therefore, though of vast importance in one point of view, can never ameliorate the temporal circumstances of an over-crowded Highland population to that extent which those circumstances so loudly call for. The condition of society is powerfully influenced in a variety of respects exclusive of education. It is well known that certain circumstances render the condition of the lower orders, at times, comparatively prosperous, even where education is neglected; while, on the other hand, the same circumstances reduce the best educated to the lowest grades of poverty and want!

But, granting that such theories as are above stated may hold good with respect to such of the poor and working classes, as are in districts where there is no want of employment, it can be easily proved that they are not applicable to the case of the poor and unemployed Highlander. The two cases are by no means parallel! With respect to the latter, it is a "*petitio principii*"—a begging of the question, as it presupposes the Highlander to be already in possession of the means of being usefully employed, and that nothing is wanting but a stimulus to raise his dormant energies to active exertions. This is far from being the case. The situation of the members of the poor cottar's family is one of extreme hardship. They are idle, not from choice, but from necessity,—not because they are unwilling to work, but because they have not the means of being employed within their reach! The cottar's children, therefore, must remain idle at home, until the age of manhood has declared that they are able to go and work for their subsistence in a distant part of the kingdom. With them there are no commercial towns or villages, to scatter among them the profits of lucrative commerce,—no manufactories to give employment to idle hands,—no eminent agriculturists to open to them the riches of the soil,—and no charitable institutions where the sick and indigent may be comfortably lodged! The only two branches of trade, viz. the herring-fishery, and the manufacture of kelp, from which many of them derived a great part of their support, have now entirely ceased. The one, it has pleased Providence to take away; and the other, legislative enactments have turned into a different channel. To the thoughtless and profligate, the lectures of the political economist may be fraught with useful instruction, but to the family of the Highland cottar they will be merely words without knowledge. He may lay down precepts, but they cannot obey them. He may exhort them to economize their means, but they want the necessaries of life, and cannot, in consequence, be charged with extravagance! He may enforce upon them the necessity of acquiring education and useful knowledge, but a naked back and a hungry belly are evils more easily endured at home than in a school-room! He may incite them to the acquisition of industrious habits, but such admonitions they would deem insulting mockery, and would be exactly of a piece with an injunction to eat, when they had no food! In short, they have no object on which to exert their habits of industry, and these habits can only be acquired in the school of practical experience, and not in that of theory and vain speculation! On such a family, languishing under a complication of miseries and hardships, the economist's instructions will be wholly lost; but let him remove them to the fertile, but as yet uncultivated, plains of Canada or Australia,—there let him tell them to use the physical energies of the body, as well as of the mind,—and then, and not till then, will they act up to his principles, and verify, with pleasing experience, the conclusions of his theories!

It must not be supposed that in these remarks there is any intention of under-valuing the vast importance and blessed effects of education. Far otherwise; it is only humbly maintained that, for the amelioration of the Highlander's present condition, education alone is insufficient, and that a knowledge of letters cannot, of itself, effect a remedy. With all its powers, and with all its influence over the human mind and character, it is unable of itself to effect the necessary requisites for the Highlander's permanent good. Legislative enactments are indispensable at the present day for the attainment of this happy end; and under these circumstances a government grant of money to carry on a judicious system of emigration, is the only mode of relieving the Highlands and Islands of their redundant population, and of securing their future prosperity.

It is an indisputable fact, that most of the Highland districts which were of late years the scenes of much distress, are a century at least behind the southern and eastern counties of Scotland in agricultural improvements. This arises, in a great measure, from a redundancy of population, which, year after year, puts a check on the very idea of improvement. It must be acknowledged too, that the climate, in many Highland parishes, does not admit of carrying improvements to that degree of perfection which is witnessed in many other quarters of Scotland; yet, though that is not attainable, it is evident that even a rate of improvement a few degrees inferior to that carried on in more favourable climates, would render a compact and wieldy population both comfortable and independent. It is indeed surprising to look back on the wretched state of agricultural improvement, even less than a century ago, in many of the Scottish counties, which now exhibit the most refined specimens of agriculture. At the period alluded to, the districts which are now so flourishing in the vicinity of the cities of Aberdeen and Inverness, were rude and unfruitful wastes! In the now luxuriant districts of Morayshire and Easter Ross, agricultural processes were then conducted in the most slovenly manner. The following description of the state of agriculture in Strathmore about eighty years back, extracted from the Statistical Account of Scotland, forms a remarkable contrast to its presently improved state.

"Since the year 1745, a fortunate epoch for Scotland in general, improvements have been carried on with great ardour and success. At that time the state of the country was rude beyond conception. The most fertile tracts were waste, or indifferently cultivated. The education, manners, dress, furniture, and tables of the gentry were not so liberal, decent, and sumptuous, as those of ordinary farmers are at present. The common people, clothed in the coarsest garb, and starving on the meanest fare, lived in despicable huts with their cattle. The half-ploughed fields yielded scanty crops, and manufactures scarcely existed. Almost every improvement in agriculture is of late date; for no ground was then fallowed; no pease, grass, turnip, nor potatoes were then raised; no cattle were fattened, and little grain was exported. Oats and barley were alternately sown, and, during seven months of the year, the best soil was ravaged by flocks of sheep, a certain number of which was annually sold, and carried off to be fed on richer pastures! The inactivity and indolence of farmers were astonishing! When seed-time was finished, the plough and harrow were laid aside till after autumn, and the sole employment of the farmer and his servants consisted in weeding the corn-fields, and in digging and carrying home peat, turf, and heath for winter fuel. The produce of the farm was barely sufficient to enable the tenants to pay a trifling rent, and servants' wages, and to procure for his family a scanty subsistence."

The counties in the south of Scotland about the middle of last century exhibited a similar picture of the state of husbandry, as may be seen in Smith's Agricultural Survey of Wigton and Kirkcudbright, where it is stated, that "estates appear to have been broken down into very small farms, or where these were large, they were held in common by two, three, and even four different tenants, who divided the labour and produce in a proportion corresponding to the rent. These, when in tillage, were sometimes 'run-rigg', when each had his proportion allotted; sometimes the whole was ploughed, sowed, and reaped in common, and the produce divided on the field, barn, or barn-yard. Houses or sheds for the cattle of the farm never entered into their conception. Their cows were, indeed, not uncomfortably lodged very often under the same roof with themselves, and sometimes without any intervening wall or partition. Their houses were commonly wretched, dirty hovels, built with stones and mud, thatched with fern and turf; without chimneys, filled with smoke, black with soot; having low doors, and small holes for windows, with wooden shutters, or in place of these, often stopped with turf, straw, or fragments of old clothes. The principal object of tillage was to afford straw for the winter support of the few cattle which the pasture maintained in summer. As they always over-stocked, this was a difficult task; and the poor starved animals, before the return of spring, were reduced to the greatest extremities. Through mere weakness often they could not rise of themselves. It was a constant practice to gather together neighbours to lift the cows or horses, or to draw them out of the bogs or quagmires into which they were tempted by the first appearances of vegetation.

"Nothing but the frugal penurious manner in which the peasantry then lived could have enabled them to subsist, and pay any rent whatever. Their clothing was of the coarsest materials; their furniture and gardening utensils were often made by themselves; their food, always the produce of their farms, was little expensive, consisting chiefly of oatmeal, vegetables, and the produce of the dairy; if a little animal food was occasionally added, it was generally the refuse of the flock, unfit to be brought to market."

But while the districts here alluded to exhibited at that period such pictures of sloth, poverty, and wretchedness, they had one advantage, whereby they were enabled, for the most part, to effect their own remedy, which was, that their population was not redundant. Quite different from the presently impoverished and crowded state of most Highland districts, they had the elements of improvement within their own reach. In short, they were in similar circumstances to those in which the Highlands will be when relieved by government of their superabundant numbers, with this advantage over the Highlands, that their climate is more favourable.

In the over-crowded districts of the Highlands, a stop is put to every desirable improvement by the excess of population. Most of those who have possessions hold them in shares so very small, that they are inadequate to support them but for a few months in the year. The men, in consequence, no sooner put the seed into the ground, than they resort to the southern counties to earn the means wherewith to support their families for the rest of the year, and they remain there until driven home by the approaching colds of winter. During their absence, their patches of land are left to the management of women and children, who cannot be expected to effect any improvement whatever. Hence the evils of the lotting-system are evident, and no improvements can ever be looked for, until their possessions be increased to that amount which will necessarily occupy the attention, and require the industrious labours, of the whole family. Let them once be placed on this desirable footing, and they will gradually emerge from their former state of many hardships, into circumstances comparatively good and comfortable. Then they will have it in their power to bestow upon their children the blessings of education ; and the then rising generation, already sensible of the advantages which they enjoyed, would never again, although they should be permitted, submit to become cottars, and make themselves liable to the drudgeries which so long harassed their forefathers! Thus they would have the means of providing for themselves, and, should the families at any time become redundant in numbers, they would possess the power within themselves of doing away with the redundancy, without making any appeals for extraneous aid. To effect this desirable end, therefore, the necessity of a government grant for emigration is sufficiently apparent.

It may be observed, that a redundancy of population in cities and in remote country districts is widely different, and must of necessity be differently estimated. It is supposed that such theorists as declaim against the utility of emigration, and look upon it merely as a temporary remedy, confine their attention too exclusively to the state of crowded cities. It is no doubt true, that, though all the flats and tenements of a whole street were vacated, by transplanting their occupants to foreign lands, no great benefit would accrue to the populous city, but perhaps the reverse, as the houses would speedily be filled with other tenants. It could not be expected that the numerous dwellings of a whole street were to be demolished whenever they became empty, and, though such were the case, perhaps it would be a disadvantage to the city in general to be deprived at once of so many of its inhabitants, who, by being tradesmen and artizans of every order and kind, were in the habit of living in mutual dependence upon each other. But in country districts the case is widely different. There, the population live on their own detached fragments of land, and have no dependence on their neighbours, but such as would be for the advantage of both parties to be dissolved. Should the huts of the poor and helpless cottar be vacated, the same may be pulled down whenever the inmates are transplanted to climes more suitable for rewarding their industry. The country, in place of sustaining a loss by the departure of its poor inhabitants, derives an incalculable benefit from the same, as a redundant population is the dead-weight which presses with resistless force on every improvement whatever. Viewing the matter, therefore, in this light, as well as in any other, the advantages of emigration, at an expense foreign to the people themselves, must appear sufficiently evident.

Emigration, so as to afford the greatest possible advantage to the distressed districts, must be carried on with much discrimination, and on the most judicious and approved principles. It should be arranged, that those only who are poor and destitute be removed to those colonies where they would soon be in comfortable circumstances by the fruits of their own labours. Let it be kept prominently in view, that the important end which is, in the first instance, to be attained, is the amelioration of over-populated districts, by removing the load which presses heavily upon them. That load, therefore, consists of numerous families of poor people, many of whom have no lands whatever, and all of whom are destitute of the means of bettering their own condition in their native country. Voluntary emigration, at the people's own expense, tends in no respect to remedy the evils so loudly and justly complained of. Due attention is earnestly called to this fact, as many are under the belief, if the population be reduced in any manner, say to one-half of its present number, that the good desired is at once effected. This is far from being the case. Voluntary emigration, at the people's own expense, if continued for any length of time, would tend to the country's ruin. In order to comprehend this, it must be taken into consideration, that, among the common population of most Highland parishes, there are two classes of people, viz. those who have less or more lands, and those who have none, and are therefore a burden on the rest. In this parish of Kilmuir, the landless class is superior in number. Now it is a fact, that, should the landless families convert all their effects into money, the gross amount of it would be inadequate to pay the one-half of their passage-money to a foreign land. It is therefore evident that, whoever may emigrate, they will not, and from too good a cause, because they cannot, unless assisted by Government, or, in the mean time, by some of the benevolent destitution committees. Those, therefore, who can emigrate by their own endeavours, are the better sort of such as possess lands, for many of those who have but insignificant patches are as unable to leave the country, from their own resources, as the landless cottars. The consequence of this is, that all who have a floating little capital of L.10, L.20, or perhaps L.30, would emigrate to a distant country, and leave behind them a helpless number of destitute families, who would be unable, from want of means, to occupy the deserted lands! Nothing could be more injurious to the welfare of the country. Its little capital would be taken across the seas by its owners, and the destitute class behoved to remain in their wonted wretched circumstances, simply because they wanted the means of emigrating, although they were otherwise the only fit and proper subjects for it. By emigration thus conducted, the population would, no doubt, be reduced, but general poverty and want of capital would be increased. The population, in short, would be lessened at the expense of the country's little wealth; and a much larger sum of money would be required to enable the pennyless families left behind to stock the vacant lands, than would be necessary at first to pay for the expense of their emigration. The poor classes are unable to better themselves almost under any circumstances while left in their native glens, whereas, were they transplanted to a foreign country where the individual members of their families could earn remunerating wages, they could not fail to obtain an independency. Unless a public grant for emigration be speedily obtained, the better classes of the small tenants, seeing that the poor landless families will ever be a drawback upon their exertions, will doubtless make every endeavour to leave the country while they are able, and thus will leave the poor and destitute to labour and toil in circumstances more wretched and miserable than ever! There cannot possibly be a stronger plea for the necessity of a government grant for emigration than this, whereby the poorest of the people in every Highland district would be transplanted in whole families to the colonies; while those in better circumstances would remain in their possessions when thus freed of the overwhelming burden of their numerous dependants!

From the various circumstances which have been brought forward in regard to the necessity for a government grant of money, to institute a system of emigration from the Highlands and Islands of Scotland as the only effectual remedy for the evils complained of, it must appear evident, that considerable good might be effected by the application of any other funds which could be made available for the said purpose, until a government relief could be obtained. It cannot be expected that any legislative measures can be procured to forward the end in view without a considerable lapse of time; and as the evils of a redundant population have so long existed, and are still in full force, acting against the best interests of the distressed localities, it would be desirable that, in the mean time, any available resources whatever should be made to bear upon those evils with a view to lessen them. For this purpose, it is humbly suggested that the benevolent destitution committees of London, Edinburgh, and Glasgow, should unite in the determination, that the residue of funds which may be in their hands be applied, without reserve or loss of time, to the purposes of emigration. Such an application, it is humbly thought, would be no alienation of the funds for other purposes than those at first intended by the charitable contributors. There is no individual, it is supposed, who contributed his L.100, more or less, four years ago, for the purpose of procuring food for the destitute Highlanders, but would gladly assent to apply any remaining balance of his contribution to the forwarding of a measure which secures the Highlanders against the ravages, and even the existence, of similar destitution in future. It is true that destitution exists even this year to a considerable extent in many districts, and it is equally true that destitution will every year exist, while a redundant population of poor landless families are left in those districts where they can get no employment, and where they can have no footing, but as dependents on such crofters and others as have enough to do for themselves. The families, thus mentioned, are beyond the compass or range of such speculative theories as are framed for their supposed amelioration! They cannot come under the denomination of working classes, as they have no work to perform. They have no lands whereupon to engage themselves, and their country can afford them no public employment. To resort to other countries where public work may be obtained, is beyond the power of but a few of them. Women and children, destitute of food and clothing, are unable to migrate in families to more favourable quarters of the kingdom to earn the necessaries of life. They are under the necessity of remaining in poverty and wretchedness at their humble homes; while the husbands, and sons who have attained the age of manhood, betake themselves to other parts of the kingdom, to earn such small amounts as are nearly expended by their families before they return to their destitute dwellings. It must be recollected, too, that the number of such families is great: in this parish they considerably exceed the number of families who have lands, and who are oppressed with the burden of their destitute brethren. To such families, therefore, a supply of the necessaries of life would, at any time, be acceptable; but the question comes to be, whether it would be ultimately more beneficial to award the remaining funds in temporary supplies of food, or to award the same for the forwarding of measures directly calculated to do away with the necessity of such supplies in future? By the former supposition, one is naturally reminded of the wary surgeon who consoles his patient by the application of ointments and mitigating balms to the surface of the deeply-rooted malady; whereas, by the latter, the expert anatomist is represented, who, sensible of the malady's nature and extent, skilfully probes it to the root, thus eradicating the deadly bane, and speedily effecting a cure!

Although the affording of immediate relief would be very desirable, and, in every respect, a pleasant circumstance to all who are eye-witnesses to the presently existing destitution; yet such are merely processes of a palliative nature, whose effects are purely temporary, and whose benefits could not be expected to extend beyond a single year. Had destitution at the present time been so general as in the calamitous seasons of 1836 and 1837, it would certainly be necessary to afford immediate relief, as was then done, but happily such is not the case. The existing want of the necessaries of life is supposed to be no greater than in many years previous to 1836 and 1837, when no relief was looked for, as the circumstances of the people, though undoubtedly miserable enough, were not of so crying a nature as to arrest public sympathy in their behalf.* Let it not, however, be supposed, that there is any wish, by these remarks, to underrate the real wants of the distressed districts, or to represent them in any light but in that of truth and reality. Quite the contrary; it is freely admitted that destitution exists in most Highland districts, and that it will exist so long as they are overburdened with a redundant population who have neither the means nor the inherent power to remedy their condition by their own exertions, or to add one fraction to their domestic comforts by a wish to be industrious, which cannot be realized. In other quarters of the united kingdom, where the peasantry enjoy a higher standard of necessary subsistence, no adequate idea can be formed of the manner in which the peaceable and loyal Highlanders have lived in many of their over-populated districts. Yet, after all, it is deemed the best policy, and the most prudent step, under existing circumstances, to use every endeavour to relieve the distress, by grappling, not with itself externally, but with the sources whence it flows, and comes into existence. Let the evil be entirely uprooted, and not pruned and pampered for no permanent benefit. Let the overgrown amount of population be judiciously lessened, and let the deadweight be removed "*en masse*," which presses on the face of every improvement. It must be evident, that such is the only method of successfully accomplishing the end in contemplation, the only means whereby the Highlanders can possibly be placed on a thriving and permanent footing. While appeals are in progress to the Legislature for the effectual attainment of this happy end, let the honourable committees already mentioned, be pleased to step forward with the residue in their hands, to keep, as it were, alive the present movement for emigration. By the assistance afforded some months ago to the destitute emigrants in this parish, about 170 souls left it, never again to be a burden upon those who remained. But were this assistance not granted and judiciously applied, it is supposed that thirty souls would not have emigrated. Some few families included in the above number received no assistance, as they had means of their own, and consisted of that class which would have been for the country's benefit had they remained, provided that a similar number of the destitute had been able, even with the assistance given, to emigrate. There is here, therefore, a direct proof of the advantage derived from the assistance lately afforded. By means of it, about a twelfth part of the redundant population of a crowded district was enabled to remove to climes where each individual's industry will meet with its reward. It may be a question with some, in what shape can assistance be best awarded? The people stand in need of food, of clothing, and of passage-money. Should supplies of food and clothing be liberally granted, then comes an insuperable bar, the want of the passage-money. It has been already stated, that, should most of the landless families sell all their little effects, they would not realize a sum sufficient to pay the one-half of their emigration expenses! It is therefore plain, that a considerable proportion of the assistance granted should be given in the shape of passage-money, otherwise they will be unable to emigrate, however liberally supplied with food and clothing. It therefore comes to this, that they stand in need of food, of clothing, and of passage-money, but of these the last-mentioned is indispensable. These remarks, it is hoped, are sufficiently clear to be understood by all who take an interest in the all-engrossing subject of emigration, and the object with which they are made is to afford minute information to all who have the will, the power, and the sympathy, to contribute to the relief of a people long and justly renowned for their heroism, loyalty, and many redeeming qualities!

---

* N.B.—Since the above remarks were written a few months ago, the crops, which then had a luxuriant appearance, have in many places failed. In consequence of the wet and boisterous harvest, many fields have been cut quite green, which renders the prospects of next season any thing but favourable. This circumstance is certainly an additional proof of the necessity of an immediate system of emigration, to remove the redundant population to the more genial climes of Canada or Australia, rather than to leave them where they are, in penury, notwithstanding all that philanthropists can do to relieve them!—*27th October* 1840.

Hitherto, emigration from the Highlands has been chiefly considered in the abstract; but the various general advantages which flow therefrom come now to be briefly mentioned.

These advantages are of a threefold description. When the overcrowded state of many Highland districts is taken into consideration, it is sufficiently evident, that much benefit would arise by diminishing the population to that extent which would enable the remaining inhabitants to apply their industry and capital to all necessary improvements, and to convert their extended possessions into compact little farms, whereupon they could live in peace and comfort, being freed from the necessity of resorting to all quarters of the kingdom in quest of employment. In this respect, the advantages of emigration to the mother country are very great, and by means of it the chances of a similar destitution to that of 1836 and 1837 would almost be placed beyond the range of possibility.

But the benefits arising from emigration are also apparent as far as relates to the colonies emigrated to. America is deemed a more suitable destination for the surplus Highland population than the colonies in the southern hemisphere, as it is less distant, and as less expenses would be incurred for the purposes of emigration. Canada is decidedly the poor man's country, where work is abundant, wages high, and the means of subsistence easily obtained. While her Majesty's colonies in North America are so valuable and flourishing, they would be vastly strengthened, and in various ways benefited, by a fresh accession of prudent, loyal, and industrious, families from the Highlands and Islands of Scotland.

But the advantage of emigration is still more extensive, as it adds to the comfort and happiness of the emigrants personally. Their condition in their native glens has been already explained ; their many hardships in earning the scanty means of support for themselves and families are sufficiently known ; and their sufferings, at times, from the want of the necessaries of life, notwithstanding all their endeavours, have been previously adverted to. But all these harassing circumstances vanish, when once the people in question become settled on the fertile plains of Canada. They are a people who are by nature prudent and peaceable, and, while they leave a locality inadequate for their support, they remove to a country where an ample field is open for their exertions and industry. In their new territories, they will be enabled to make provision for their children, and for their children's children, for ages to come. In all probability, their descendants may hereafter enjoy the blessings of peace, plenty, and independence, when their native land may have undergone revolutions like other nations of the earth. It must be remembered that empires and kingdoms, great and powerful, have risen and fallen in quick succession. These, like the fashion of the world, have passed away, and however flourishing a kingdom may now be, there is no guarantee for its permanency. Such may be the fate of the emigrants' native land, while their descendants may be rising and flourishing in prosperity and numbers, in other regions beyond the seas, and there speaking the emphatic language of their ancestors—the language of Fingal and Ossian, in its pristine purity and elegance.

From what has been already set forth in regard to the unhappy circumstances in which most of the Highland districts are situated, it is sufficiently evident that urgent appeals must necessarily and speedily be made to the Legislature, to take the matter into serious consideration, and to grant that remedy which is so loudly called for. There is no other course now open, and there are no other means whereby the existing evils can be effectually and permanently cured. It is well known that Highland landlords, from motives of humanity, were in a manner forced to parcel out their lands in trifling fragments to the increasing population, and thus to let them, much to their own disadvantage, to such as had neither skill nor capital to improve them. But what was thus done from humane and charitable purposes, was done, it is believed, without the least anticipation of the baneful consequences of such a system. And great as the extent was to which lands were subdivided, there still remain a numerous class in every district, in some cases amounting to more than half the population, who have no share of them, and who, as has been already stated, are merely dependants on these lotters and crofters, whose possessions are by far too contracted for themselves. It is therefore the unquestionable duty of all Highland proprietors, of every nobleman and gentleman connected with the Highlands and Islands, and of all and sundry who take an interest in the welfare and happiness of a people whose tales of virtue and valour can never be forgotten, to petition Parliament for a judicious system of emigration, and for a continuance of that system, year after year, until the districts of distress be effectually relieved from the pressure of a superabundant population. The causes whence the evils complained of took their origin are sufficiently known, and rather than descant on how or when these causes came to exist, it is the more prudent and desirable course to demand strenuously that they should no longer be permitted to exist, and to apply, with becoming earnestness and zeal, to the proper quarter, for the annihilation of the effects. In this manner, the various districts of the Highlands and Islands may be speedily rescued from the danger of future distress, and the threefold advantage which would result from a government grant for emigration, should, of itself, afford a motive sufficiently powerful to justify the unanimous sanction of Parliament to the boon required.

While much has been already said for the promotion of the Highlanders' temporal good, a few sentences may be appropriately addressed, in conclusion, in behalf of their spiritual welfare. Their lot has been cast in a country certainly inadequate for their support, but, blessed be the Almighty Disposer of all events, they are a people who have had hitherto an opportunity of hearing the joyful sound of the gospel,—who have the Scriptures disseminated among them in their native language;—and who have the advantage of schools for training the young in the various branches of useful knowledge. In this manner they have happily enjoyed the means of obtaining moral and religious instruction, whether or not they availed themselves of these blessings to the best of their ability. And, under these circumstances, can it be otherwise than a matter of deep regret, that thousands should leave their native land without a preacher or teacher to enlighten themselves and their offspring in the new world? A famine of bread is truly alarming,—but what is poverty, what is the want of bread, in comparison with a spiritual famine? As bread constitutes the proper nourishment for the body, so the word of God constitutes the only fit and salutary food for the soul. Where the common means of sustenance are wanting, natural life languishes and soon becomes extinct. And so, "where there is no vision," or where there is an absence of the word of life, "the people perish." It is, therefore, earnestly hoped, that, when any permanent system of emigration is established, a benefit which is so loudly called for, due attention will be paid to the means of communicating moral and religious instruction. It would indeed be melancholy, while ample provision comes to be made for the temporal comforts of the redundant population of the Highlands and Islands, by removing them to the genial climes of a foreign land, that no provision whatever should be made for their spiritual benefit. Can the kingdom part with so many thousands of its brave and loyal natives, without affording them the means of moral and religious instruction in the land of their adoption?

High is the honour, and signal the felicity, which will be conferred on all who are instrumental in the dissemination of scriptural knowledge among their brethren of mankind. Cast a retrospective glance at Athens and Rome, at Colosse and Philippi, at Thessalonica and Ephesus, at Corinth and Antioch, —and behold those cities at first sunk in the grossest idolatries and abominations! But view them afterwards, when a happy change was effected,—view them at the interesting period when the banner of the Cross waved in triumph over the banners of the Cæsars, and say what halo of glory surrounds the head of him who first carried into those cities a knowledge of the Bible! Look at the now enlightened and highly favoured Britain, which was at one time inhabited by a rude and lawless population,—who practised the most revolting rites and ceremonies,—who were the dupes of the wildest superstition, —who fed upon acorns, and worshipped the mistletoe;—but that kingdom now sits as mistress among the nations of the earth, and is looked up to with emulous admiration by surrounding kingdoms for her light, her liberty, and her constitution. Be sensible of this, and see what happy achievements were accomplished by such as were thus instrumental in the diffusion of knowledge among a people who once "did sit in darkness, and in the shadow of death." The same blessed results, it is hoped, will attend such endeavours as may be made to enlighten the Highlanders who may leave their native land, by placing within their reach the elements of a religious and constitutional education, that they may be enabled hereafter "to walk worthy of the Lord, unto all pleasing, being fruitful in every good work, and increasing in the knowledge of God." (Colos. i. 10.)

A SKETCH OF THE AGRICULTURE OF FIFESHIRE.

By Mr George Buist, Bombay.

The area of the county of Fife is understood to contain 209,226 acres of cultivated land, and 89,664 of uncultivated. It forms an irregular peninsula of forty miles in length and eighteen miles in breadth, bounded on the north and south by the ample estuaries of the Tay and Forth, and on the east by the German Ocean. Its surface is irregular, a border of trap hills extending over an area of about 60,000 acres over its northern limit; whereas a succession of slopes or elevations of less or greater altitude, with broad intervening valleys, extending from east to west, fill up the remainder of the county. The average altitude of the most prominent of the hills may be about 600 feet, a few, and but a few, exceed 1000, while the east and west Lomond hills rise to an altitude of 1400 feet, and 1700 feet respectively. The rocks in the first-mentioned division of the county, as well as of nearly all the hills, consist of trap; the valley of Stratheden is of old red sandstone, while the whole of the more level portions of the south rest on rocks of the coal-formation. The soils are extremely various, and generally consist of portions of the subsoil properly so called, changed in its texture and properties by long continued cultivation, or of comminuted portions of the trap-rocks adjoining. The subsoils, again, consist of extensive beds of sand or water-worn gravel, generally overlaid, supported by, or commingled with, a hard stony variety of clay called "*till.*" In 1800 the county was divided amongst no fewer than 1200 proprietors, of whom about 400 were entitled to be Commissioners of Supply, the value of a large proportion of the estates was then from L.400 to L.3000 per annum. From L.3000 to L.6000 there are only a few, and only one above L.8000.* The county of Fife was, in the reign of Alexander III., valued at L.1349 : 10s. Scots annual rent. In 1650, a second valuation took place, which still continues to be held valid for the regulation of cess, land-tax, and other burdens, at a rental of L.362,584 : 7 : 5 Scots. This is greatly above the average of the adjoining counties, and is above one-tenth the value of the whole of Scotland put together. The real rent of many counties exceeds in pounds Sterling the nominal valuation in Scots money, whereas in Fife the former is more than one-third below the latter, being calculated in 1800 at L.212,000.* This indicates the early period at which Fife had arrived at a high degree of agricultural celebrity, and probably accounts for the very prominent place which it presently holds in this way in Scotland. The geographical form of the county, of which no point is ten miles from some sea-port, so that the utmost facilities for the import of manure and export of agricultural produce is thereby afforded, together with its geological condition, which afford abundance of lime and coal on every hand, is exceedingly favourable in a physical point of view for the advancement of agriculture. If thus happily situated, from natural causes, for the promotion of these ends, Fife is equally fortunate in the same way from the distribution of its landed property. There is no district in Scotland where proprietors, whose rental varies from L.100 to L.1000 a-year in such numbers farm their own estates, or farm along with them a portion of rented land, or where the possessors of more ample grounds keep a portion of these in their own hands, such as to constitute them practical farmers in the most genuine sense of the term. By this means a class of individuals is generated, which, happily, unites the higher orders of the aristocracy with the tenantry and yeomanry, tending to promote a friendly intercourse and good understanding betwixt them, elevating, on the one hand, the tone of more ordinary agricultural society, on the other, tending to imbue the more extensive possessors of the soil with the knowledge, feelings, and spirit of cultivators.

---

* Thomson's Survey, &c.

To proceed with a narrative of the improvements in Fifeshire, we may begin with agricultural implements.

The *Iron Plough* of the best construction is almost in universal use throughout the county. It is made with consummate elegance by local blacksmiths and agricultural implement-makers. The wooden plough, also of the best form and structure, in some parts still prevails. It is, in all essential particulars, similar to the iron one, by which, however, it is rapidly being displaced.

---

* Thomson's Agricultural Survey of Fife, 1800.—Vol. i. of the Farmer's Magazine, 1800.

The *Harrow*—the heavy harrow, called a brake, used, when Dr Thomson wrote in 1800,* for breaking stiff, and loosening and tearing up grass-roots and quick weeds, has gone entirely into disuse. "The construction of this is much the same with that of the common harrow, only much larger and heavier, and furnished with a greater number of teeth. Sometimes it consists of two parts, which move on iron joints; constructed in this manner, the whole harrow will be able to touch the ground, and no part of it pass without doing execution." Ordinary harrows are now generally made of iron. There is nothing remarkable in their form or structure. The lozen-shape, which seems preferable to the rectangular harrow, though occasionally employed, has not as yet come into general use. A small light harrow is occasionally used for covering the smaller seeds, such as those of clovers or of grasses. The potato-harrow, lately introduced into Perthshire, is sometimes, though not extensively, employed.

The *Grubber* is the most popular of our recently introduced agricultural implements. It is the invention of Mr James Finlyson, a native of Ayrshire, who had it patented for England alone. In the year 1825, it was introduced into Fifeshire by James Blyth Fernie, Esq. of Kilmux. The original Finlyson required four horses to draw it. A great improvement was soon after this made upon it by Mr J. Thallon, blacksmith, Smithy-green, near Kennoway, who altered its construction, so as to increase its efficacy, and lightened it so that it may now be drawn by two horses instead of four. In this improved form it is now to be found in almost every farm in the county.

The *Horse-hoe* or drill-harrow, which is used in Fifeshire, exists in a vast variety of forms. Of late a great improvement in the form of its teeth has been introduced, by having them bent, and made to project obliquely, so as to bring the root-weeds to the surface on Finlyson's principle.

The *Swingle-trees*, by which all these implements are dragged forward by the horse, are now mostly made of iron. The form of this iron swingle-tree is in many cases similar to that of the old wooden one, now getting into disuse. It is hollow in the core, and formed by a flat piece of iron, bent round and welded. Some iron swingle-trees consist of a single flat bar. These, though more easily made than the hollow ones, have neither the same strength nor lightness. Wooden swingle-trees, though cheap at first, are in the long-run so uneconomical, that they are speedily becoming extinct.

---

* Agricultural Survey, p. 126.

Rollers, which used formerly to be made of stone or of wood, are now manufactured chiefly of cast-iron. The length of the cylinder of the roller is generally about 5 feet; its diameter about 24 inches; it is always divided into two, sometimes into three, pieces for the conveniency of turning.

Machines for Sowing Corn are scarcely at all in use in Fife, and those for sowing grass-seeds, though occasionally found, are by no means prevalent. The liabilities of both to go wrong, and general imperfections attached to them, have made them to be set aside in many cases where they have once been tried, and prevented their general introduction, smart farm-servants being considered the best sowing-machines that can be employed.

The *Turnip-barrow* is now universally employed, and is in Fife very skilfully constructed. It admits of a very considerable variety of forms.* From the universality with which bone-dust is applied for turnip manure, a bone-dust sowing-apparatus now always forms a part of the turnip-barrow. Plumping-machines for dropping in bone-dust and turnip-seed in little parcels, at intervals of six inches or so from each other, are occasionally in use, but, though tending considerably to economise bone-manure, are not in Fife favourite implements. No other sowing-machines are prevalent amongst us.

The *Presser*, an implement which should have been described along with the rollers, is chiefly in use for preparing the softer soils for the reception of wheat, and is to be found on farms on the slopes inclining to the Forth.

---

* The drill-barrow for sowing turnips and other small seeds, is simple and of easy management. One kind requires only one man, and another two, to manage it. Some years ago, a kind of drill-machine for turnip was in use, which was drawn by a horse, run upon two wheels which turned the seed box—had a share for making the rut or furrow, and dragged a small harrow behind for covering the seed. But this is now less commonly used, and has given way to others more simple, and equally answerable.—Thomson, p. 108 (ann. 1800).

The *Levelling-box* is chiefly necessary where considerable transformations on the large scale have been making on the surface of the ground. Where this is the case, it is always to be found: where otherwise, it is not required.

Implements for reaping. The common toothed hook, which needs not here to be described, was for a long time in Fife the sole implement for reaping. This has now in a considerable measure given place to scythe or smooth-edged hooks, which, however, are much greater favourites with the work-people than their employers;—it being believed by the latter, that, unless by very careful management, a considerable quantity of shake, and much irregularity in the lay of the grain, is occasioned by them.

The mode of bargaining with the reapers in Fife, unlike that which prevails on the north of the Tay, is to engage them on days' wages; or, much more generally, to agree with them at a certain rate for the harvest. Besides these wages, certain allowances of bread, beer, and occasionally of potatoes and milk, are made to them. Among some disadvantages attendant on this, as compared with the *threaving* system, is the irregularity and magnitude of the sheaves, which, unless when carefully attended to by the binder, sometimes attain the absurd dimensions of from four to five feet in circumference, instead of three feet, which they ought never to exceed. This saves both the reaper and binder considerable trouble, but produces a sheaf very inconvenient for handling, afterwards very difficult to win in the field, and apt to heat in the stack.

The ordinary *Scythe* has of late begun to be extensively employed; and as the workmen become expert in its use, proving both a convenient and economical, and an expeditious implement. Drummond's cradle-scythe still more recently has become a favourite; and were as much systematic care taken to perfect the workmen in its use, as is expended in instructing them in ploughing, sowing, stack-building, and the other more important operations in agriculture, and in properly drilling the hands required for gathering the corn from the swathe, it seems probable that, in a few years, this implement may become universal in harvest operations.

The *Reaping-Machine* on Mr Bell's or the clipping principle, has only been successfully employed to any extent on two farms in the county. On the farm of Dunbog on the Earl of Zetland's estate, it has been employed by Mr Moodie since 1828, with the most brilliant and unfailing success. This gentleman has cut with it every season from seventy to ninety acres of corn under nearly every variety of circumstances, and in the course of these ten years an area of about 800 acres altogether has been cut by him. Mr Hain of Claremount is the only other farmer who has introduced with success Mr Bell's machine into his harvest-field. He has employed it since 1833. Two or three other machines of the same construction have been tried in other parts of the county, but not proceeded with. These reaping machines were a few years ago made of a very perfect form, and in considerable numbers, by Mr Fernie, mill-wright, Cupar. None of the reaping-machines on Mr Smith's principle have ever been employed in the county of Fife.

Horse-rakes are very generally used, even after the most careful reaping. This implement admits of no great variety of form. The ordinary horse-rakes, from the flatness of our ridges, are often of great magnitude and sweep. The canting-over, or American form of rake, is one of the most prevalent varieties.

Carts. The prevailing form of cart is the ordinary coup or box cart. This, occasionally fitted up with additional movable or slip sides, which, though now general over Scotland, were, about thirty years ago, almost peculiar to Fife. The frame or tops, prevalent to the north of the Tay, by which a coup cart is so speedily and so conveniently converted into a corn one, is but little used here, a separate corn cart, which admits of the load being placed low, being considered greatly preferable. A vastly improved variety of this cart was, a few years since, invented by a farm-servant in Clackmannanshire. By this, the centre of gravity of the load is raised no higher than the level of the top of the wheel. This kind of corn cart is cheap, strong, and peculiarly convenient for rough roads and uneven grounds, and is getting extensively into use.

Thrashing-machines seem to have been very early introduced, after their invention, into Fifeshire. Before 1800, that is within fourteen years of their invention, we find it stated by Dr Thomson, that, in almost every parish, they had been erected to the extent of seven or eight in single parishes, and to the amount of nearly 300 within the county; they now exist every where, so that there is not probably a farm in Fife, above the size of 50 acres, which is without them. Though the principle be the same as at first, the details are immensely improved,—an additional shaker having been added. Lifters, or an endless cloth called "*a brock machine*," is employed to elevate the imperfectly thrashed "*brock*" from the lower to the upper part of the mill, to be subjected once more to the action of the drum. Other improvements in detail have taken place which could only be made intelligible in description by the use of numerous drawings. A machine for *humbling* barley has been attached to many mills. It consists of an upright shaft with horizontal iron arms, which revolve with great rapidity, and strike against the grain as it passes through horizontal tiers of perforated iron plates placed parallel to the arms of the machine. It dresses the most refractory barley to admiration, and without damaging the grain. Additional pairs of fanners, driven by the mill, supply themselves with grain, and, in several mills the dressing process is entirely completed by the machine, so that it comes out sifted and cleaned ready for the stock market.

The best mills of this sort are at Kilmux and Fosterton. The greatest improvement recently made on machine thrashing in Fifeshire, is the introduction of steam as a motive power. Since 1824, no fewer than twenty-six steam engines have been constructed for this purpose in the eastern part of Fifeshire, without taking into account what have been put up in the west. The first who applied steam-power to thrashing machines in this county was Mr Haig of Seggie, who, possessing an engine of 25 horse-power for distillery purposes, made it to drive a thrashing-mill about 10 horse power. The following is a list of 27 mills driven by steam in this neighbourhood, with the date of their erection and name of the farmer, and designation of the estate where they are to be found.

Farms.	Farmer.	Estate.	Date.
Airdry.	....	Airdry.	......
Cafindilly.	Walker.	Crawford.	1835.
Clintry.	Watt.	Raith.	1835.
Craigie.	Thomson.	Balcarres.	1834.
Carnbee.	Aitkin.	Balcaskie.	1835.
Crail.	Dr Bonthron.	Erskine.	......
Balcarres.	Lindsay.	Balcarres.	1838.
Balneil.	Bogie.	....	1835.
Balgonie.	Young.	Balgonie.	......
Do.	Do.	Do.	......
Blebo.	Tullis.	Blebo.	1838.
Drumcarro.	Yool.	....	1838.
Falklandwood.	Dudgeon.	Nuthill.	1824.
Foodie.	Wilson.	Foodie.	1834.
Fosterton.	Hutchison.	Raith.	1836.
Kincaple.	Haig.	Tarvit.	1836.
Kilgour.	Dunn.	Nuthill.	1826.
Kilmux.	Fernie.	Kilmux.	1834.
Kinninmonth.	Paterson.	....	1836.
Kingsdale.	Ballingall.	Kingsdale.	1836.
Kirkaldy.	Douglas.	Tarvit.	1830.
Lordscairnie.	Tullis.	Crawford.	1834.
Methilhill.	Haig.	Wemyss.	1830.
Newton.	Russel.	Dundass.	1833.
Pilmure.	Balfour.	Wemyss.	1833.
Seggie.	Haig.	Tarvit.	1805.
Treaton.	Ballingall.	....	1832.

These engines are of the simplest construction, without a walking-beam or parallel motion. The crank is commonly placed high over the cylinder, and connected with the piston-rod by a single connecting-rod, the lower end of which is furnished with wheel-guides. They are commonly from four to six horse-power, and can be had from 20 to 25 lb. a horse-power. High-pressure and condensing engines are about equally abundant. The engines themselves are well managed, and so admirably kept in point of order by the farm servants, that the present writer, who has had considerable experience in such matters, has never seen the condition of the Fife thrashing-mill engine surpassed by those of the most crack London steam-ships or Scotch spinning-mills.

To the thrashing-mill is occasionally attached, as at Kilmux, rollers for bruising grain, and a straw-cutting machine ; and it were well that these appendages were of more frequent occurrence amongst us.

Draining has been long vigorously practised in Fife. Where large masses of water or of marsh land were to be dried, the cuttings are often of stupendous magnitude. The chief operations of this sort have been those of Loch Leven, at Loch Ore, at Lochty Moss, and Rossie Moss. Some of these cuttings are twenty feet deep and forty feet wide. While Elkington and Anderson's systems of draining prevailed, operations on their plan were carried on to a great extent. Since the introduction of Smith's furrow-drain and deep-ploughing system, the farmers have shewn themselves fully alive to its merits, and may challenge Scotland for the spirit and extent with which they have proceeded. For many years past furrow-drains have been put in, in Fife, to the extent of probably not less than 500 miles a-year. This, at a cost of L.15 to the mile, would amount to L.7500, or to a capital permanently sunk in draining of L.150,000. At a competition, where a prize was offered for the greatest amount of furrow-drains executed within a given period, it appeared that single competitors were draining, on their own account, at the rate of from sixteen to twenty miles a-year, and that one farmer had put no fewer than ten miles of drain into a single field. The expense of these operations is, for the most part, borne by the tenant alone, though in many cases the landlord cuts the drains and the tenant fills them. In all cases Smith's system is strictly adhered to, stone-drains being much the most prevalent. Where the ground is injured by excess of these, the drains are cut wider than is otherwise necessary, for the sake of burying the stones. Where stones are scarce, or difficult to come by, tile-drains are employed. Few of our soils are such as to require that these should have sole-plates.* About the year 1830, a Fife farmer put into his ground no fewer than 220,000 tiles in the space of two years, each tile being fourteen inches long, which in all would amount to about forty-seven miles of tile-drains.* Along with the tile-draining, the subsoil and trench ploughing of the Deanston system also prevail to their full extent.

---

* We deprecate the neglect of sole-tiles in every case. The clay that may appear hard enough to bear tiles when newly cut, may soon soften as much after the water in the drain has remained a short time upon it, as to allow the sinking of the tiles into it. Let the Duke of Portland's experience in Ayrshire operate as a warning to all tile-drainers against neglecting to use sole-tiles.—EDITOR.

The mineral manures used in Fife are lime and marl; the former of these is worked and burned at above twenty different quarries, in various parts of the county. It is very extensively used in agriculture, though farmers of late prefer *feeding* to *stimulating* manures. The following are the principal places at which it is presently worked: Forther, Pitlessie, Cults, Annfield, West Lomandlaw, Toadstones, East Lomondlaw, Hangingmyre, The Bishop-hill, Benarty, Lesslie, Charleston, Duloch, Burntisland, Innertiel, Tyrie, Chapel, Thomasford, Teasses, Griegston, Winthank, Dumbarney, Cornceres, Sypsis, Kingsbarns.

Shell-marl used to be extensively used as a manure in Fifeshire, but has of late got into disuse. It is still extensively employed in Forfarshire. It is found at the following places, in beds varying from two to eight feet in thickness, and covering, so far as can be ascertained or guessed at the area, as assigned beneath:

Lundymoss,	10 acres.
Duriemoss,	6 ...
Near Inchrye,	5 ...
Near Raith,	1 ...
Mugdrum,	1 ...
Near Balbirnie,	1 ...
Pitlair,	3 ...
Cash-loch,	1 ...
Stravithy,	3 ...
Bowsmoss,	4 ...
Rossie Loch,	4 ...
Rossie Loch (2d deposit),	2 ...
Berriehill,	1 ...
Kinghorn Loch,	10 ...
Lordscairnie,	2 ...

With various other lesser deposits not examined; the whole probably amounting to nearly 100 acres.

Sea-weed may be viewed as a mineral-manure, as the alkali and salts which it contains chiefly affect the soil. Along the south and east coast of Fife, where farms skirt the shore, seaware in a great measure takes the place of farm-yard manure, which is occasionally carted inland, by the permission of the proprietors, to less favoured localities on the same estate. Sixteen loads of sea-weed are reckoned adequate manuring for an acre of ground, equal to about twenty loads of farm-yard manure. It costs from 1s. to 1s. 2d. in collecting and carting. It acts with great effect on hay-stubble cut early, and often yields an admirable after-math. Farms which can command sea-weed give a rent of 10s. more an acre than others of similar quality and position without this privilege. The sea-weed used consists of the common varieties of fuci, algæ, and confervæ, which prevail upon our shores. A green, delicate variety of weed, found alone in protected situations in the estuaries of our rivers, is used in the upper parts of the Forth, but still more especially so in the Eden. Mr Meldrum of Bloomhill, near St Andrews, besides collecting the weed on his own shores, rents that on those of his neighbours. He frequently applies from 300 to 400 cart-loads in a single year, and reckons ten cart-loads good and fifteen heavy manuring. When laid on in winter, and ploughed into the furrow-ground, it produces a fine pulverizing effect. With this alone a wheat crop of six quarters an acre has been produced, with a heavy crop of beans the year after, without additional dung. Sand, gravel, and clay, which in many parts of Fife are laid in great quantities on the surface of the ground, are rather to be considered as alteratives than as manures.* Saltpetre, sea-salt, prepared kelp, bleachfield refuse, gas-work lime, and animalized carbon, have all at different times been employed to a greater or lesser extent, if not so considerably as to affect the character of the agriculture of the county. Their popularity is not, however, at present on the advance.

---

* Mr Hay of Seggie.

Farm-yard Manure is here treated with peculiar skill and care. The court-yards of most of our farm-steadings have water-spouts all around the eaves of the buildings, so as to prevent the rain which falls upon the roofs from injuring the manure. When carted to the field, the dunghills are very carefully made up, so as to expose them as little as possible to injury from the weather. A plan worthy of universal adaptation has been introduced by Mr Balfour of Pilmure, that of covering over his field dunghills with earth, laid spadeful thick, as if they were potato heaps. This covering, which the workmen put on when they could not be otherwise profitably employed, completely prevents the action of the wind and rain, and intercepts and absorbs those gaseous exhalations which would otherwise escape, and is itself converted by them into an excellent earthy compost. The practice of soiling cattle in the yard for the sake of the additional manure produced by them, is prevented from being so extensively resorted to as it otherways would be, from the cattle seeming less thriving when penned up in summer than when permitted to rove at large in closed grass fields. The extent to which sheeppasturing has recently been introduced, tends greatly to meliorate the soil, whether during the grazing or turnip-feeding season. Green turnip tops are occasionally employed as a manure. If cut off in autumn, and ploughed in immediately afterwards, and before they have had time to fade, they act for one season over the area on which they have grown equal to ten tons per acre of the best farm-yard manure, if the turnip-crop be a fair average. They form very poor feeding for cattle, and are apt to scour them. Large white turnips, such as are sown for autumn use, afford the largest amount of leaf. At most of our distilleries, the drippings of the court-yard are collected in a well, and pumped off as liquid manure. As these are not required by the distillers themselves, in consequence of the immense command of ordinary manure they possess, they are sold at so much the barrel to the farmers in the neighbourhood. Bone-dust is now universally employed as a turnip-manure. I am not aware of any peculiarity in the mode of using it in Fife, as compared with the other counties of Scotland. It has been tried as a top-dressing for grass, and a manure for other crops as well as turnips, but not to any considerable extent. Rape-cake is at present coming extensively into use as a manure, and is just now a favourite one, it is chiefly applied to grass.

---

* This application is now very prevalent where the soil is either much too stiff or too open; it is extremely important.

The greatest attention has been long paid to the culture of live-stock in the county of Fife. The farm-horses are of a strong, active, not very large breed. The quantity of corn allowed them has of late been considerably increased. Potatoes and corn are often mixed together, and steamed along with Swedes or yellow turnips, and make an excellent feed. These substances are also often given raw, separately, and without preparation. On many farms, horse corn is bruised with rollers. Straw-cutters are getting into extensive use. The turnip-slicer is also employed, not only for cutting turnips for horses and cattle, but occasionally for slicing potatoes and turnips for sheep. In this last case, it is mounted on a carriage like a wheelbarrow, and is accompanied with large troughs, to prevent the cut vegetables from falling or lying on the ground.

The horses used for riding or gig harness (for few of the farmers in Fifeshire who have families are without some springed vehicles for their accommodation), are generally hardy, well formed half or three-quarter bred cattle. The ranks of a yeomanry regiment lately disbanded were said to have exhibited a greater proportion of well-mounted soldier-looking troopers than any other district in Scotland could have produced. Very few thorough bred horses are kept for their own use by farmers in the county, though those which are raised by them, or are transiently in their hands for the purposes of sale, are occasionally used by them on the road, turf, or field.

The average allowance over all the county of force employed, is one pair of horses for every fifty acres of arable ground. This is considered a ploughgate of land. Statute-labour road-money is charged accordingly. Though this is the average, so greatly does the nature of the ground affect it, that, in the soft black lands in Stratheden, one pair of horses are quite adequate for the cultivation of seventy acres, while on the stiff wheat soils near Fifeness, one pair is required for every thirty acres.

There are said to have been originally two breeds of oxen peculiar to Fife,—"*the Fife runt*" and the Falkland breed. The former of these, a strong, coarse, hardy variety of ox, is understood to have been indigenous, and to have been well adapted for the cold, swampy condition of the county, before it was meliorated by agricultural improvement. This seems to have been the only variety of cattle possessed by us down to the accession of James VI. to the English Crown. This monarch, more remarkable for classical acquirement than financial prudence, had, during his residence at Falkland, come under obligations to many of the Fife landed gentry, the most convenient mode for discharging which he found to be sending them presents of improved breeds of live-stock from his new dominions. This is the present Fife breed, before which the poor aboriginal stock speedily gave way. The oxen throughout the county, in general, belong either to this race in a pure state, or crossed with the Teeswater. Improved short-horns are very prevalent, but less so than the above in this district. It is a singular instance of the spirit and determination of Fifeshire agriculturists, that, in this case, they have withstood the judgment of the Highland Society, whose fiat, in most cases absolute and irresistible, has been issued against Fife stock as unworthy of patronage, and unable to compete with the improved short-horned breeds. In evidence that their position is not untenable, the Fife farmers have produced specimens of the pure native breed, which have again and again taken the premium offered for the best ox, of any breed whatever, against all comers, at the Society's great annual show.

Fife possesses a peculiar native breed of sheep as well as of oxen, but these, unlike the cattle, seemed to have derived no benefit from the royal favour. They are white-faced, and somewhat larger in size than Highland sheep. They are very hardy, but not distinguished for either the quantity or quality of their wool or flesh. They are said to have been first known in an extensive tract of sandy downs in the north-east of the county called the Tents-moors. They are chiefly patronised by a few active and skilful farmers of the old school, whose admiration of the things of other years indisposes them for the acceptance of the new races of sheep. The black-faced or Highland breed in Fife, as in every other quarter of Scotland, was, within these forty years, almost the only one known to us besides the aboriginal white-faced, and is now rapidly falling into disuse. The races which have taken its place are the Cheviot, the Leicester, and the cross-breed betwixt the two. A cross betwixt the Cheviot and black-faced is sometimes found, but is not a favourite. The previous cross-breed is much the most general, many beautiful flocks of them prevailing throughout the county. The pure Leicester, along the south coast particularly, is rapidly coming into use. The farmers take the utmost care to have tups and ewes of the first quality: they themselves visit the most celebrated English and Scotch border-markets to obtain a breeding stock, and, being eminent judges, hesitate at no price, provided they can get animals to their mind. I am not aware of any South Downs existing in the county. The following statement from Dr Thomson will shew how entirely the views of farmers have changed on this point since the year 1800.

> "Anciently sheep formed a considerable part of the live-stock of this county. Every farmer almost kept a quantity, which fed with his cows in summer, and in winter ranged in common over the whole country. But when the system of husbandry came to be changed; when the culture of wheat became more general; clover and rye-grass more commonly sown, and the lands, at the same time, continuing open and exposed, or the thorn-fences young, and therefore ready to be checked in their growth, or entirely destroyed by the sheep (for the wool of sheep is fatal to thorns), their numbers greatly decreased, and now few, comparatively speaking, remain. There are no flocks, perhaps, consisting of above 300 or 400 in the possession of one man; and few nearly so numerous. These are chiefly to be met with on the Lomond Hills, the high grounds on the north, on Eden's Muir; and in the Downs, in the parish of Leuchars, commonly called the Tents Moors. Besides, many of the gentlemen, and some of the principal farmers, keep a few principally for the use of their own families; and some who have a taste for that kind of stock, and convenience for feeding them, keep more, and what they do not use they sell to the butcher. Some gentlemen-farmers and others follow the practice of purchasing annually in the spring a few scores of great ewes, or ewes with young, for the most of the black-faced kind. These they lay on good pasture; the lambs they dispose of, in the course of the summer, to the butcher, and the ewes at the end of the season."—(Survey of Fife.)

So far are farmers now from placing or restricting sheep to hill-grounds and wild-pastures, that the districts above spoken of, with the exception of the Tents Moors, where water is deficient, are occupied entirely by oxen and young horses;

whereas the invaluable manuring power, and other conditions of the sheep, make them prevail over the finest and richest of our cultivated lands.

It is not necessary to speak in detail of the other varieties of live-stock to be found in Fife, because the value and amount of these is too inconsiderable to be taken into account in any general description of the agriculture of this district.

The farm-steadings lately erected are of the greatest magnificence and magnitude; the finest in Fife is that of Mr Fernie of Kilmux, which was built in 1833, and cost about L.2000.* The steam-engine erected here for driving the thrashing-mill works two pair of grinding stones for making oatmeal. A drying kiln is also attached, not only for preparing the corn for the mill, but for slightly drying it, so as to make it keep readily in the granary in any quantity that may be desired. The steading at Foodie, on the estate of John Small, Esq. London, is another beautiful specimen of a complete set of farm buildings. Very many others may be pointed out in Fifeshire as examples of skill in designing, and beauty of execution. Great care is now taken in fitting up the stalls for feeding cattle. The oxen are arranged together in pairs, in each stall, as the social disposition of the animal makes them feed with more avidity in this way than singly. Apertures are in general left towards their heads that the cattle-feeder may supply them with the least possible disturbance to them. The partitions betwixt the stalls are formed from slabs of grey sandstone pavement from Forfarshire, as are also the feeding-boxes, &c. from this very convenient and durable stone. Two or more separate stables exist on all our better varieties of farm-steadings; one exclusively for the work-horses, and one for the riding-horses and horses of visitors. A third and fourth stable is occasionally found in more spacious steadings for mares with foal, for invalids, and other purposes. To go, however, into all the minutiæ of an improved Fife farm-steading, with its courts, swing-gates, sash-gates, and attendant paddocks and fences, would occupy too much space, and may, if improvements go on on these as heretofore, fail to afford a picture of the condition of things a few years hence. It may be noticed of implements not directly belonging to the farm-yard, but immediately connected with agricultural produce, that great improvements have of late been generally introduced in the construction of corn-mills for grinding oats. Instead of the mill-stones being made, as was within these few years universally the case, of mill-stone grit, of the coal-formation, or large-grained compact sandstone of the old red sandstone formation, which, in a short period, were ground down into their elements, and mixed among the meal, they are now universally formed of French bhurr-stones, such as are used in ordinary flour-mills. A wire-sieve, driven by the mill itself, saves the laborious operation of sifting, which, till lately, was entirely performed by manual labour. The buildings in which the machinery is inclosed are much more spacious than formerly, and generally contain a large amount of granary accommodation, which is made available by means of pulleys and sack-lifters worked by the power which drives the mill. I am not aware of any peculiar excellency in the flour-mill of Fife over those in other parts of Scotland. Barley-mills are very prevalent in the county, but are possessed of no special peculiarity which requires to be described.

---

* Statistical Account of the Parish of Kennoway.

Flax-mills are nearly extinct with us, as very little indeed of that crop is cultivated. There are six or eight of them in the county altogether. They are of the common rude and antiquated form, the flax being first bruised by three grooved rollers working into each other, and then scutched by horizontal scutching arms being swept rapidly round by an upright spindle, in which their ends are inserted. The flax, when submitted to the scutching, is held fast against an armed iron-plate by a man's hand.

Bone-grinding mills of the best construction are numerous within the county, the principal of them being at Kirkaldy, at Leven, and at Kemback.

Circular saws for cutting up waste timber, for paling, hurdles, and other purposes, are also numerous, and are mostly driven by water. A saw-mill fitted up with frame-saws, and capable of turning out work of any kind on a large scale, exists at Leven, the property of the talented, liberal, and spirited firm of Messrs Balfour and Company.

The length of leases allowed in Fifeshire is now almost universally restricted to a period of nineteen years. The rent is, in a great proportion of cases, made payable by the fiars' prices of grain. A much more judicious system of arrangement, in reference to rotation, than that which formerly obtained, has recently been introduced. The tenant is now left at liberty to treat his ground as he may think fit during the whole of the earlier part of his lease, so as to give full scope for the employment of his industry, capital, and skill. He is, towards the closing years of his occupancy, bound merely to such a system as may prevent him from scourging the ground, so as to protect the interests of the proprietor. From what has already been said, it will be expected that the very happiest condition in the relations of landlord and tenant should exist in Fifeshire. The proprietors themselves, being mostly resident, and skilled in the practice of agriculture, can adequately appreciate the exertions and merits of the farmer, and sympathize with his tastes, habits, and pursuits. The houses of the farmers in Fifeshire are generally handsome, and handsomely furnished, and shew, from the condition of the library, drawing-room, and cellar, that the Fife farmer is neither ignorant of, nor excluded from, the more elevated sources of intellectual, sentimental, or social enjoyment. Amongst the proprietors in Fifeshire who feel peculiar pride and gratification in seeing their tenantry and cottagers comfortably housed and accommodated, the Earl of Leven and Melville, Lord William Douglass, Colonel Lindsay of Balcarras, and Mr Tyndal Bruce, may, amongst a host of others, too numerous to be named, be quoted as special examples.

There are in Fife no fewer than eight Agricultural Societies. The Fifeshire Agricultural Association for the protection of agriculture, founded in 1834. This society is not regularly periodical in its meetings. The Fife Agricultural Society, instituted in 1831, for the breeding of cattle, horses, and sheep: it meets annually on the last Thursday of March. The Trafalgar Agricultural Society, for the encouragement of cattle and grain produce, by sweepstakes. The Auchtermuchty Society, which meets on the first Monday of October every year. The Windygates Society, which meets in March, and was founded in 1820. The Collinsburgh Society, which meets twice in the year. The Western District Society, commenced in 1834; and the Kinglassie, instituted in 1814. The objects of all these societies, save the first, are precisely similar, and have in view the improvement of breeding, of implements, of seeds, and of general systems of husbandry. They distribute annually many hundred pounds in the shape of sweepstakes and of premiums. It may be mentioned, as an illustration of the extent to which green crop farming prevails here, that it is not unusual to offer a prize for the best field of turnips, not less than forty acres in extent. At a show held some weeks since at Kirkaldy, a farmer who competed with seventy acres of turnips was beaten. At these competitions, a strong ground of amicable rivalry often exists betwixt the landlords and tenants, on the results of which the former have often no great reason to plume themselves. The spirit of emulation generated by these amongst all classes of agriculturists, and amongst none more than the farm-servants themselves, upon whose diligence and care so much of the success of the competing objects depends, confers the greatest benefits on agriculture, both as an art and a science.

The Fife farmer has no secrets in his profession which he desires to keep exclusively to himself,—has no jealousy of the rivalry of others, or desire to withhold from those who may wish to possess it, the fullest information on every point connected with his profession, so that any one wishing to put to the proof the correctness of this outline of the agriculture of Fifeshire, may, by visiting any part of the county, have an opportunity of doing so.

I may conclude this paper by some computations as to the best and most economical sorts of rotation adapted to the better soils in Fifeshire, which has been furnished to me by Mr Balfour of Pilmure.

Rotation for Six Years.

Potatoes—Three ploughings and harrowing, per acre,	L.2	2	0			
Manure, 15 tons, at 7s.	5	5	0			
Driving manure,	0	15	0			
Seed, 4 bolls, at 6s. 6d.	1	6	0			
Hoeing and horse-labour,	1	10	0			
Planting and cutting,	0	3	0			
Gathering and dressing,	0	15	0			
Driving to market,	1	15	0			
				L.13	11	0
Wheat—One ploughing and harrowing,	L.0	14	0			
Seed, 4 bushels, at 6s. 6d.	1	6	0			
Cutting and harvesting,	0	16	0			
Thrashing and driving to market,	0	16	0			
				3	12	0
Turnips—Three ploughings and harrowing,	L.2	2	0			
Drilling and spreading manure,	0	10	0			
Manure, 12 tons, at 7s.	4	4	0			
Driving manure,	0	12	0			
Seed and sowing,	0	5	0			
Hoeing and horse-labour,	0	14	0			
Driving turnips,	1	5	0			
				9	12	0
Barley—One ploughing and harrowing,	L.0	14	0			
Seed, 5 bushels, at 5s. 3d.	0	16	3			
Cutting and harvesting,	0	16	0			
Thrashing and driving to market,	0	16	0			
				3	2	3
Clover seed—12 lb. clover, 1 bushel rye-grass,				0	13	0
Oats—One ploughing and harrowing,	L.0	14	0			
Seed, 6 bushels, at 3s.	0	18	0			
Cutting and harvesting,	0	16	0			
Thrashing and driving to market,	0	14	0			
				3	2	0
				L.33	12	3

Produce of a Six-Years' Rotation.

Potatoes, 35 bolls of 4 cwt. per acre, at 6s. 6d.,	L.11	7	6
Wheat, 32 bushels, at 6s. 6d.	10	8	0
Turnips, 25 tons, at 6s.	7	10	0
Barley, 42 bushels, at 3s. 3d.	6	16	6
Clover, 2 tons, at 60s.	6	0	0
Oats, 48 bushels, at 3s.	7	4	0
Straw of wheat,	2	0	0
Do. barley,	1	10	0
Do. Oats,	1	16	0
	L.54	12	0
Deduct for labour,	33	12	3
Net return for rent, taxes, and profit,	L.20	19	9

Rotation of Five Years.

Potatoes, ⅓ acre—Three ploughings and harrowing,	L.0	14	0			
Manure, 15 tons, at 7s.	1	15	0			
Driving manure,	0	5	0			
Planting and cutting,	0	1	0			
Hoeing and horse-labour,	0	10	0			
Seed, 4 bolls, at 6s. 6d.	0	8	8			
Gathering and dressing,	0	5	0			
Driving to market,	0	11	8			
				L.4	10	4
Turnips, ⅔ acre—Three ploughings and harrowing,	L.1	8	0			
Manure, 14 tons, at 7s.	3	5	4			
Driving manure,	0	9	4			
Drilling and spreading,	0	6	8			
Seed and sowing,	0	3	4			
Hoeing and horse-labour,	0	9	4			
Driving turnips,	0	13	4			
				6	15	4
Wheat, ⅔ acre—One ploughing and harrowing,	L.0	9	4			
Seed, 4 bushels, at 6s. 6d.	0	17	4			
Cutting and harvesting,	0	10	8			
Thrashing and driving to market,	0	10	8			
				2	8	0
Barley, ⅓ acre—One ploughing and harrowing,	L.0	4	8			
Seed, 5 bushels, at 3s. 3d.	0	5	5			
Cutting and harvesting,	0	5	4			
Thrashing and driving to market,	0	5	4			
				1	0	9
Clover seed—12 lb. clover, 1 bushel rye-grass,				0	13	0
Oats, 1 acre—One ploughing and harrowing,	L.0	14	0			
Seed, 6 bushels, at 3s.	0	18	0			
Cutting and harvesting,	0	16	0			
Thrashing and driving to market,	0	14	0			
				3	2	0
				L.18	9	5

Produce of a Five-Years' Rotation.

Potatoes, ⅓ acre—40 bolls, at 6s. 6d.	L.4	6	8
Turnips, ⅔ acre—28 tons, at 6s.	6	12	0
Wheat, ⅔ acre—36 bushels, at 6s. 6d.	7	16	0
Barley, ⅓ acre—44 bushels, at 3s. 3d.	2	7	8
Oats, 1 acre—60 bushels, at 3s.	9	0	0
Pasture, 1 acre,	4	0	0
Do. do.	3	10	0
Straw of wheat,	1	10	0
Do. barley,	0	10	4
Do. oats,	2	5	0
	L.41	17	8
Deduct for labour,	18	9	5
Net return for rent, taxes, and profit,	L.23	8	3

Rotation of Four Years.

Potatoes, ½ acre—Three ploughings and harrowing,	L.1	1	0			
Manure, 16 tons, at 7s.	2	16	0			
Driving manure,	0	8	0			
Hoeing and horse-labour,	0	15	0			
Seed, 4 bolls, at 6s. 6d.	0	13	0			
Planting and cutting,	0	1	6			
Gathering and dressing,	0	7	6			
Driving to market,	0	17	6			
				L.6	19	6
Turnips, ½ acre—Three ploughings and harrowing,	L.1	1	0			
Manure, 16 tons, at 7s.	2	16	0			
Drilling and spreading manure,	0	5	0			
Driving manure,	0	8	0			
Seed and sowing,	0	2	6			
Hoeing and horse-labour,	0	7	0			
Driving turnips,	0	12	6			
				5	12	0
Wheat, ⅔ acre—One ploughing and harrowing,	L.0	9	4			
Seed, 4 bushels, at 6s. 6d.	0	17	4			
Cutting and harvesting,	0	10	8			
Thrashing and driving to market,	0	10	8			
				2	8	0
Barley, ⅓ acre—One ploughing and harrowing,	L.0	4	8			
Seed, 5 bushels, at 3s. 3d.	0	5	5			
Cutting and harvesting,	0	5	4			
Thrashing and driving to market,	0	5	4			
				1	0	9
Clover seed—12 lb. clover, 1 bushel rye-grass,				0	13	0
Oats, 1 acre—One ploughing and harrowing,	L.0	14	0			
Seed, 6 bushels, at 3s.	0	18	0			
Cutting and harvesting,	0	16	0			
Thrashing and driving to market,	0	14	0			
				3	2	0
				L.19	15	3

Produce of a Four-Years' Rotation.

Potatoes, ½ acre—35 bolls, at 6s. 6d.	L.5	13	9
Wheat, ⅔ acre—32 bushels, at 6s. 6d.	6	18	8
Turnips, ½ acre—25 tons, at 6s.	3	15	0
Barley, ⅓ acre—42 bushels, at 3s. 3d.	2	5	6
Hay, 1 acre—2 tons, at 60s.	6	0	0
Oats, 1 acre—48 bushels, at 3s.	7	4	0
Straw of wheat,	1	6	8
Do. barley,	0	10	0
Do. oats,	1	16	0
	L.35	9	7
Deduct for labour,	19	15	3
Net return for rent, taxes, and profit,	L.15	14	4

ON SHELTER.

By Mr D. Bain, Edinburgh.

It is now a year since some observations by me on shelter as a mean of improvement were given to the public through this Journal, and I think they were well received both in this country and in Ireland. I mention this last for two reasons; first, to express satisfaction that Ireland begins freely to receive and interchange with this country any thing in the shape of improvement; and next, to say that one of her rural associations, that, namely, on the Earl of Gosford's estates, and formed and presided over by him and Mr Blacker, has adopted a plan for circulating the proceedings at its annual meetings, which, I think, might be adopted generally with great advantage; that is, to print off in a separate form the portion of the newspapers in which they appear. They also wisely endeavour to make these proceedings consist of useful details of the experience and opinions of the parties, as to the improvements they are carrying forward, instead of useless complimentary speeches; a principle adopted at the last two meetings of the Highland and Agricultural Society of Scotland, and worthy of all acceptation.

In my last paper upon shelter, I spoke so abstractly and generally, that I thought it impossible I should be misunderstood in any quarter. Having since, however, committed the farther offence of endeavouring to protect the agriculture I would promote, my humble suggestion of an improvement has been interpreted into " a sweeping charge against *the nation*, or individual landlords,—I had not exactly made up my mind which,—that, for want of wood shelter, the east of Scotland is not quite half cultivated." Now, I sincerely believe, that the east of Scotland in particular, would be benefited by shelter; in that impression I should be happy to see the principle have a fair trial; but I blame no one who may not as yet have seen the matter in the same light as I do, and should even regret if great expense were incurred, in the view of carrying out the general plan I propose, without due consideration, and, as nearly as possible, the certainty of success.

On another point I seem to have been misunderstood, in at least one respectable instance; and, as it will very distinctly introduce my subject, I may here advert to it. I said, " As a general position, shelter is, in Scotland, of the greatest value. It is nearly *a national object*. It might reclaim many thousand acres, that without it can never be reclaimed, and almost incalculably improve many thousands more. A survey of the kingdom, with this particular object in view, would not be out of place;" and the editor of this Journal added, " This is a good hint, and the attention of the gentlemen connected with the great Trigonometrical Survey should be directed to it." Both have been misunderstood. I meant merely, that it would be justifiable to go to the expense of a survey by scientific men, for the purpose of suggesting where and how shelter might be applied most beneficially, but leaving it to every proprietor to consider the suggestion, and act upon it or not as his views of interest or convenience might dictate; and the suggestion of the editor was more economical still. But something very different has been understood. It has been doubted " how far it would be expedient for government to interfere in this manner;" and concluded, that " in this free country, it would not do to force proprietors to plant against their will, nor to plant and ornament the properties of the indolent and careless at the public expense."

Both these ideas are wide of my intentions. I recommend shelter as I would any other improvement, for consideration generally, but for adoption only where it may be thought good; and under this explanation, I think the great and general plan of shelter I recommend, cannot be recommended too earnestly; and that no measure could seem more justifiable than having the principle examined, and even tested, at the public expense; as " art is in this case, as in most others, greatly more than strength;" and I shall, before concluding, shew that there is hardly an improvement now conceivable of greater individual or national utility.

I have stated at least, that " shelter is in Scotland a national object;" and I have shewn that, in the county of Devon in England, " by high mounds surmounted by coppice woods, commonly forming altogether barriers of thirty feet high, *the* *rigour of the unfriendly blasts is so softened, that many of the inferior hills are cultivated to the very summits.*" I now proceed to lay before the reader such evidences of the benefit of a similar practice in Scotland, as I have been able collect.

I may set out by saying, that *all* my correspondents approve of the principle of shelter. Some have thought it right to advert to an equally necessary principle, that of laying the land dry by draining; but that I consider to be now established in the mind of every agriculturist, and the spirit with which it is acted upon needs no eulogium from me.

The first communication I shall use is from Mr Charles Lawson, nurseryman, of this city, and he writes as follows:—

"As instances of the beneficial effects of what you term *wall shelter*, we may mention the plantations along the sea-side at Gosford, East-Lothian, where walls of considerable height have protected forest trees, till these reached above the same elevation; and they again have imparted shelter farther inward, until, at a distance of twenty or thirty yards, the trees seem scarcely affected by the sea breezes, although on ground which formerly produced nothing of higher growth than sweet-briar, wild Scotch rose, and whins." It may be added, that, on the outside of the wall, which is close upon the sea, there is in many places nothing but sand and ling, while within it is a paradise—

'A wilderness of verdure, fruit, and flower.'

"The Earl of Lauderdale's garden at Dunbar," continues Mr Lawson, "is an instance also worthy of notice, as being a place where the finest horticultural products are raised, although quite close to the sea; and where, were it not for the walls and hedges around and throughout the garden, its surface would be swept by the unbroken fury of the northern, as well as easterly, blasts, from the German Ocean, and of course produce no more than the beach around it, which is, at best, a short and entirely sapless grass.

"But, perhaps," persists Mr Lawson, "the best instance of wall shelter we could name, is the garden of Mr Traill of Woodwick, at Kirkwall, Orkney. It is surrounded by a belt of planting composed chiefly of elm, abele poplar, alder, and sycamore; and these could never have grown had they not been protected on the seaward side by a high wall, which they have now overtopped to a considerable height.

"Were farther examples necessary to prove the beneficial effects of wall shelter on the coast, they might be found, although to a less extent, in and about all the towns and villages on the sea-side. The same advantageous effects of wall shelter, although, perhaps, in a less marked form, may be found throughout the country, in high and exposed inland districts; and it might be worth your while to procure a report of the means used for shelter at the Leadhills, Dumfriesshire (the highest cultivated ground in Britain), where we are convinced walls must form a principal mean for the attainment of that object,"—a conjecture which I have found to be correct.

As an example of the benefit of *plantation shelter*, in ordinary circumstances, Mr Lawson instances the entire property of Blair-Adam, near Kinross, " which, under the judicious management of its late proprietors, has been changed from forming part of *a bleak and barren moor, to one of the finest and most fertile-looking properties on the great North Road*," —a fact that will be remembered by very many.

In my first paper upon this subject, I had said, upon theory merely, that " even *hills*, were it worth while to contend with them, might be conquered by *successive belts of wood;* and, if not cultivated (as they evidently have in many instances been), at least made of double or triple value for pasture ;" and Mr Lawson, somewhat to my surprise, adduces an instance even of this, completely confirmatory in every particular: " As a remarkable instance," he says, " of the effects of plantation shelter, I would especially mention the Binhill of Cullen in Banffshire. I should consider the altitude of this hill upwards of 1000 feet: and although within a few miles of the sea, and without the least shelter from surrounding ground, it being much the highest in that district, it is now clothed with trees almost, if not altogether, to the summit; *to attain which, encircling zones or belts were planted, from the bottom upwards, at such intervals of time as to allow the one being high enough to afford shelter to the other.*"

These united instances, furnished by a gentleman of great experience, and particularly when corroborated, as they are, by all the others who have favoured me with their opinions, appear to establish the correctness of my theory, even to an extent that I could not have anticipated ; and I sincerely believe that there is no doubt but it is correct.

I may add another species of confirmation, which I, at least, have never doubted. In travelling over Scotland (which, twenty-five years ago, I did to a considerable extent at once), and in many of my journies since, on seeing a large and well cultivated field, occupied by a thin and starved crop, or a garden with a wall only a few feet high, and scarcely any fruit, I have asked the farmer, or the gardener, or, failing to meet either of these, the labourer, whether they did not think that these fields or gardens would produce better if they were sheltered, and their answers have uniformly been, not such assents as their wish to please might dictate, but, that " they were *lost* from want of shelter;" that " the crops were turned into *windlestraws* from want of shelter;" and, in some instances, that " great part of Scotland is lost from want of shelter." If my informant was the farmer, I have asked why the country was so lost ? and his answer was generally undecided ; that it was not for tenants to shelter it, and it had not been taken up by the landlord. Perhaps he defended the omission, on the principle of expense; though the loss of the crops for so many centuries must seem an expense so overwhelming, as to render regret the only feeling proper in the circumstances, whoever might be the party to blame.

I would now enter upon the subject of the profits of a better system; but it is almost unnecessary. It is hardly possible to avoid seeing the difference between the value of a crop of " windlestraws;" meaning a thin, starved crop of oats or barley, or any other species of grain, and the value of a heavy and succulent crop. The one is a mockery of the labours of the husbandman, the other enriches him and the soil together. From the one he has hardly his seed, and the most scanty subsistence for his cattle, or manure for the soil; from the other, he has every thing to reward him for the present, and to assist in multiplying reproduction for the future.

One of my correspondents, after detailing the method adopted by him for reclaiming some twenty acres of waste and swamp, and which, by draining and shelter combined, is now worth L.5 an acre, though it had never previously yielded half as many shillings, concludes as follows :—

" I concur in all you have said as to the benefit of *shelter*. We have an excellent illustration of it in this county," meaning Kinross; and he instances the estate of Blair-Adam, already mentioned. " It is true," he continues, " the improvements were commenced by the late proprietor's grandfather, about an hundred years ago; but it may do away with this objection, and the objection to planting generally, from the length of time required to make trees of any value for use or shelter, to refer to the method of planting adopted by myself; for, though it is not *ten years* since I began this operation, many of the trees, particularly the larches, are about twenty feet high, and all in the most healthy and thriving state; and the oaks and elms I find equal to any I have planted on land worth L.2 an acre, while this was not worth 2s. These last were planted young from the nursery; and in farther evidence of the benefit of shelter, I attribute their flourishing condition *to the shelter* they derived from the larger trees with and amongst which they were planted, added to the plan of thorough-draining adopted as to both."

It is necessary to state, in explanation of this paragraph, that the plan of planting indicated as to the larches, was that of *transplanting thinnings*, about six and a half years old, in place of destroying them, as is usual at present; so that, to bring them to the height of twenty feet, took altogether about sixteen years. But I think a distinct memoir upon this subject would be of value, and therefore shall not forestall its interest by further explanation at present; but the plan is that of transplanting trees when too thick, intead of destroying them.

Another correspondent, namely, Mr Mackenzie of Pinnacle, by Jedburgh, writes as follows:—

"I consider planting for shelter an improvement of the first importance, and second only to draining; not only on high and exposed situations, but on *all lands of secondary character*. The practice of proprietors in Roxburghshire fully corroborates this opinion, as I believe there are few counties in Scotland where planting, with the view of shelter, has been, or is still, adopted on so large a scale. Where *judiciously arranged*, it is not only a shelter for *stock of all kinds, against inclement and changeable weather, but it very considerably ameliorates the climate, and facilitates the growth of corn*, as well as the *rearing and feeding of stock.*"— And no one has ever travelled through that interesting county, and seen the exuberant crops of corn, scarcely moving within their sheltering belts and hedges, and the cattle in their exuberant pastures, switching away the flies (who, it may be said, in passing, are excellent judges of temperature), while, at half a mile's distance from them, the traveller (*summa diligentia,** as Cæsar has it), on the unsheltered moor, is guarding his nose from the assaults of the cutting wind, without being satisfied of the benefits of shelter. But even Roxburgh requires to be *closed in*, in many quarters. It has also ranges of useless moor, admirably adapted to shew the value of shelter—and by-and-by they will do so; for at Whitburn Moor the experiment has been begun, of giving a spirited tenant possession for twenty years for nothing; and, at the end of that period, it will pay more in one year than it has paid from the beginning of the world.

---

* It is pretty generally known, that an unfortunate schoolboy translated this "on the top of *the Diligence*," instead of the top of his speed.

I come now to my last and most elaborate authority. It is that of Mr Thomas Bishop, a ranger and improver in the classical district of Dunsinnan, and will doubtless be considered of great interest and value. It is dated 12th May last, and runs as follows:—

"I have perused your paper on shelter as a mean of improvement. It is well drawn, and varied; and I have no doubt, that, in many places of the country, as well as in this neighbourhood, many instances may be adduced in evidence of the truth of your statements, and the correctness of your inferences.

"My time is at present so fully occupied, that I shall neither have space nor composure to give such a detail as I could wish, of the advantages of *shelter* from plantations, which I have seen, in cold and exposed situations. I must therefore say, generally, that they are very great; not only to the agriculturist for his grain crops, the feed and comfort of his live-stock, and the beauty of the country, by a change of scenery; but *they are the source of an extended income to the proprietor*, who, by a comparatively trivial outlay of money in planting, and the purchase of plants, judiciously selected for soil and climate, secures himself the most beneficial returns;" even from the woods, while he may be said to be creating cultivable land. "At the same time he is creating healthful employment for the industrious and labouring classes, at every period of the year; and in all is adding to the wealth and happiness of the country, in accordance with the primitive injunction of the *Great Lawgiver*, to subdue the earth."

"Within my recollection, from the flow of the Almond Water, by Lyndoch Cottage to the vale of Monzie, a distance of ten or twelve miles in length, by two and a half in breadth, the whole was one bare waste of moorland, whereon the whaup,* the plover, and moor bird reigned supreme, being only occasionally invaded by flocks of wild geese, in their passage from north to south. The greater part is now under thriving plantations, with various smiling residences in the intervening hollows; and many acres, both on the northern and southern slopes, have been rescued from a state of sterility, on the different divisions belonging to Ochtertyre, Abercairney, Gorthy, Cairney, Campsie, Lynedoch, and Methven.

---

* Curlew.

" Previous to the division of the common muir of Methven, included in the above range, in 1793, the venerable Lord Lynedoch (then Graham of Balgowan) and Lord Methven, had each secured their lower slopes of land adjoining the moor, with belts of plantation. The year following, I entered Lord Methven's service, and in 1798 planted about sixty acres of the higher muir ground, valued at 2s. per acre, for shelter to eighty or ninety acres set apart for cultivation, and let in three divisions to six individuals. The progress made in improving the land was very slow for the first fifteen years, but thereafter went on more rapidly, *being aided by the shelter derived from the growth of the plantations*; and the whole has now become *fair land*, bearing annually crops of oats, barley, pease, potatoes, and turnips, &c.; and in spring 1838, exactly forty years from the time of putting down the said plantation, I sold four acres of larch and fir (average growth) standing therein, for L.220; which, with the value of reserved trees, and average amount per acre of thinnings sold previously, gave a return of L.67 per acre.

" It would only be tiresome to give more instances of this kind, which I could give, as to the value of shelter arising from plantations, with their own intrinsic value to property, as now exhibited on the estate of Methven. I need only say, that, since the present proprietor (R. Smythe, Esq.) succeeded his father, the same system has been pursued, by which upwards of 300 acres of moorland have been planted, *and as many added to the land in cultivation*, upon which eight or ten families have been located; and, from the mode adopted, of beginning them with a very low rent, rising progressively in terms of their leases, they have in every instance bettered their circumstances by sheer industry (and a very little aid in draining, and blasting earthfast stones), and not only been able to live comfortably, but to take more extensive farms.

" In favourable seasons, they grow excellent crops of all farm-produce, wheat excepted. Lime applied in moderate quantities has proved a valuable stimulant; and recently, seeds of the richer abiding natural grasses have been introduced, mixed with ryegrass and clover, to secure a greater extent of good pasturage in the rotation of crops.

" That these effects may be attributed in a great measure to *shelter*, is *beyond controversy*; nor is it less pleasing to reflect how much profitable employment has been afforded, and still continues to be afforded, and which may justly be styled *a national advantage*; seeing that *ten* labourers are now regularly employed on the estate for one that was formerly employed, exclusive of occupants of land, smiths, wrights, &c. and their families. When the severity of winter precludes the possibility of beneficial labour at ordinary occupations, recourse is now had to the thinning and pruning of the plantations; and the *short day* is cheerfully spent, where, not *many* years ago, the father could only have *ploughed the ashes* of a few dying embers, in listless misery, in the midst of a starving family.

"Farther, when I first lived on this estate, we were in the habit of purchasing timber for the erection of farm-steadings, &c.; now we have a full supply for all these purposes, besides having annual sales for many years bygone. Two years ago we erected a powerful saw-mill, which is kept in constant work, with great advantage and convenience to the neighbourhood; and it may be proper to add, that, not being favoured with a naturally copious supply of water, *we are constructing reservoirs*, in distant damp hollows among the plantations, to retain the snow water and winter rains *for summer use*, to manufacture the produce of the land or plantations as required.

"I trust that this hurried statement of facts may meet your views, as an exemplification of what may be done in reclaiming much of the elevated and barren districts of the country, *aided by shelter*, and bringing it into a state of fertility and valuable productiveness, thereby securing provision for the increase of population, or leading to our becoming an exporting nation, and so ending the excitement as to corn-laws, which is at present so much agitating the minds of the community."

I have given this letter entire, not only as a tribute due to an improver who must now have grown venerable in his valuable employment (though his handwriting is as firm as if he were only forty), but because it is in every line replete with facts and observations of the greatest value, and which, I think, must carry conviction both to the landlord and tenant, and to every other member of the community, of the value, the almost unspeakable value, in this country, of *shelter*.

How it is to be accomplished on the scale that in some instances would be necessary, to be effectual, is another and very important consideration. It is clear, from the alarm that has already been taken, and which I have referred to in the outset of this paper, that nothing would be permitted to be done by the *public*; and that is proper. But I think the landlords of Scotland have fairly established for themselves the character of the most thoughtful, independent, and prudently liberal of any in these kingdoms, and consequently, I suppose, in the world. I think the principle must be considered as of at least 240 years' standing, for so long it is since James VI. of Scotland, reared and educated there, promulgated a law for *Ireland*, that, in principle, is not to be surpassed even in Scotland at this hour, namely, he made it an integral part of the charters of the settlers of Ulster, that they should let their lands on *leases*, for not less than twenty-one or twenty-seven years, *in suitable portions, and with substantial steadings* for their tenants, to be kept in suitable repair. These laws, if duly followed up, would have made Ireland a garden by this time. They are the laws in the breast of every Scottish landlord; and, consequently, if he shall become but satisfied that *shelter* is necessary to his interest, on whatever scale, he will speedily find the means of carrying his impressions into effect; and if I shall resume the subject, it will rather be to keep, or bring it into view, and, perhaps, to suggest a choice of plans of procedure, than at all to suggest the means.

I would only add in conclusion, that, while I say shelter is a national object, I do not mean that it should be effected at the expense of the nation, but only that it should interest every one in the nation; and farther, that the shelter I have proposed from the beginning, is not merely ordinary shelter, but shelter upon such a scale, and taken up and conducted upon such principles, as to achieve, as speedily and effectually as possible, whatever shelter can do; not the shelter of farms but of estates, and not merely the shelter of estates, but of districts, till *the kingdom* shall be sheltered as far as it requires it. Lest this may seem extravagant, I must recur to the example I have given of a *county* sheltered in England. I must also repeat what I have said, that art may do more even in this case than strength; and that " an hundred yards of wall or wood rightly placed may do more than a thousand placed without skill." I must remind also of the farther doctrine, that " when we consider the cause of barrenness deliberately, we are surprised to find, against our general preconception, it is not *height* that leads to it, but *cold;* for in the highest hills we find occasionally sheltered valleys, and as often as we do so we find those valleys fertile; while in plains as low as the general level of the country, we often find approaches to sterility, or sterility itself, if they happen to be open to any blighting wind."

The examples of the grounds of Woodwick in Orkney, and of Gosford in East-Lothian, point precisely to the same conclusion, that, behind a shelter, trees will grow to the very brink of the sea; and that at the distance of twenty or thirty yards within such a shelter, the blast becomes innocuous. Now, neither of these walls are formidable, but they are very useful; and if such walls, with such plantations as they shelter, could turn the moors and scaurs of Scotland into fields like those at Gosford House, or even at Methven Castle, they would certainly very speedily repay the expense of constructing them, and be thereafter a source of free and almost incalculable annual profit, and that is my point.

There is no part of Scotland so high as necessarily to be barren. I have shewn that on the very summit of Corryárick, there is the root of an oak that must have been at least six feet in diameter, and the centre of an extensive forest, where there is now not a tree. Such a forest might rise there again, and it would shelter herds of beeves and give pasture for them, where, at present, a sheep is starved. But I trust that farther argument is unnecessary; that speedily we shall see the shelter of land admitted into the science of agriculture as a cardinal principle, and patronised accordingly. I consider shelter as necessary to a country like this, as clothing to a human being. Without it there can neither be health nor life for vegetation, nor comfort for man nor beast; and with it, the highest and bleakest heath may be turned, as in England, into "*a hollow way*," the scene of warmth and vegetation, of beauty and productiveness, of individual and national wealth. *Quod ut fiat, precor et obsecro! nam maxime desiderandum est.*

ON ARTIFICIAL HATCHING.

The Egyptians are undoubtedly entitled to the credit of having, from a very remote period to the present time, originated and continued the practice of artificial incubation, in a manner which excites wonder and admiration. They no doubt derived the first suggestions for their *mamals*, or hatching-ovens—which the enthusiastic Reaumur has pronounced to be nobler monuments than their towering pyramids—from observing the simple operation of Nature in developing life in the ostrich's egg, when laid in the warm sand, without the heat of the parent bird. They perceived that a certain degree of heat only was required for the development of the embryo, and therefore conjectured, that any warmth, precisely the same in power and continuance, would produce the same effect.

It seemed, then, only necessary to imitate the process that chance had indicated, and to apply to eggs, by some artificial substitution, the same degree of temperature, and for the same period, that would be communicated by the body of the hen.

These *mamals*, which are built of brick, and about nine feet in height, with a gallery from one end to the other, forming the entrance to the oven, to afford accommodation for keeping the eggs at the proper temperature, have been described by Cuvier and various writers, but not with the accuracy which would enable us to adopt the Egyptian system, even if it were practicable, in our climate; because, if we credit Sicard and other writers, it is kept secret, and said only to be known to the inhabitants of a single district in the Delta. Yet we know that the interior of the mamals may be visited freely, and the process of incubation inspected without restraint, and that they are heated by fires; but the precise *mode* of regulating them is not made known, and the object in this seems to be, to preserve to the Government a monopoly in the productive process of these singular contrivances, which are said to be 386 in number, and regularly licensed from the Aga of Berme.

These ovens are capable of hatching 100,000,000 eggs annually, and the contractor only engages to give two chickens for every three eggs, receiving for his perquisite any surplus number which he may produce; but as a third is considered a fair average deduction for failure, the superintendent of each oven has a money-payment of thirty or forty crowns, besides his board, for six months' work.

A subject of such vast importance in the production of human subsistence, was not indifferent to the Greeks and Romans in their days of science and refinement, who, unable to obtain the necessary information from the Egyptian practitioners, tried the agency of hot-beds, and failed. The same attempt has been often tried, and with similar ill success, for this reason, that it was not in accordance with that of nature; and though it might answer fully in such a climate as that of Egypt, which undergoes so few atmospheric changes during the autumnal months,—in which alone the Bermeans practise their art,—it is impracticable in the comparatively cold and very variable temperature of any European climate.

Other means than those of the hot-beds were subsequently attempted, and with more favourable results. But for a long period, Europe being madly involved in the crusades and other pursuits opposed to the quiet and useful employments of science, the hatching of eggs was little thought of there; but, on the revival of science in Europe, the art of artificial hatching was again tried successively in Malta, Italy, Sicily, and France. Kings and princes contrived to obtain the secret, and obtained skilful superintendents from the Delta; but the results were not sufficiently favourable to excite individual speculation. It was more the harmless and pleasing amusement of crowned heads, who could afford to pay for it, than the remunerative occupation of private persons labouring for their maintenance. Men of science, however, paid attention to it, and the Chinese mode was introduced into Portugal. This practice was to put the eggs into fine sand, to cover them with a mat, and place them on a furnace heated with coal.

French ingenuity was stimulated. Olivier de Serres gives a description of a small, portable, metal oven, in which the eggs were intermingled with feathers heated by lamps around. But he found this oven more amusing than profitable; for the chickens were far more delicate and subject to disease, than those brought forth in the ordinary way. At length, models of the Egyptian mamals were brought into France, and the celebrated physician Reaumur, who invented the thermometer which bears his name, entered into the subject of artificial incubation with great energy; but, being unfortunately misled by the representations of travellers, he mistook their blunders for defects in the art itself.

Conceiving it was to the atmospheric temperature of Egypt that the success of the practice there was entirely attributable, and that the climate of France was too unfavourable for the purpose, he sought out another system altogether, instead of adhering to that of the Bermeans, and proposed other contrivances.

It is useless to detail all his experiments, as they proved unsuccessful. In some cases, the hot-bed *dressed* the egg for eating, instead of bringing forth chickens. In another instance, in which he constructed a cavity or oven (heated by the hot-bed) for the eggs, instead of plunging them into the dung, the life was developed, and some chickens were formed, and even feathered; the eggs putrefied about the eighth or tenth day. He had reason to think, in the course of a succeeding trial, that the foggy vapour which bedewed the eggs was injurious to the embryos within, which ceased to exist beyond the seventh day; and at length he ascertained that the vapour arising from the dung entering through the pores of the shell was fatal to the germ. To obviate this, "I caused," said he, "one of those casks called half-hogsheads to be sunk into the bed of dung, after having had a hole dug large enough for its admission, taking care to have the edges raised three or four inches above the surface of the hot-bed. The top alone had been previously converted into a movable lid, by means of cross-bars, and one large and eight smaller holes were made in it, and bunged with corks, to serve as regulators of the temperature within. The eggs were let down into the casks in round baskets, about two inches in diameter less than the casks, some being deep and others shallow, the former containing two, and the latter one layer of eggs. I caused three of these baskets to be placed in the oven, which contains about 200 eggs, in such a manner, that the lowest were some inches distant from the bottom, and the highest a few inches lower than the upper edge. When the time had elapsed in which my previous experiments had failed, not one egg in this new oven was tainted; and, at the end of twenty days, the gardener, who had taken care of so many unsuccessful broods, came in the evening to tell me, with the greatest possible emotion, what he knew must be very pleasing news, namely, that one of my eggs was chipped, and the chick could be heard within, endeavouring to chirp. This chicken did not disappoint our hopes, having been hatched next day; and it was even preceded by some others, and followed by a great many more. From that time, indeed, I began to see some hatched every day."*

Chopineau, the author " L'Homme rival de la Nature," came nearer to the true principle on which the Egyptian practice has been conducted; and if circumstances had favoured him, he would have probably succeeded better than his celebrated experimental predecessor. His hatching-house, constructed to contain 8000 eggs, was contrived with great ingenuity. It was a round structure, in the arched top of which were four triangular windows, opening with cords and pulleys.

---

* Library of Entertaining Knowledge.

The air was admitted through four pipes at opposite points, opening and closing from the outside, and the stove for heating warm water, by which the eggs were supplied with warmth through a funnel, was placed underneath. The warmth derived in this way was more uniform than had been imparted by any previous mode. It was cooled in a moment by the admission of the external air through the windows and the pipes communicating with the shelves on which the eggs were ranged. The heat was retained in the lower range, where it had the greatest tendency to coolness by the thick walls of the structure, and the wool with which they were lined; and to correct the effects of dryness, steam was introduced with an hygrometrical regulator, to render the exhalation similar to that of a sitting hen.

Then succeeded Dubois' simple plan of a cabinet ten feet long and six wide, with a low floor. The door was covered with carpet, and the windows consisted of four large glass panes. In the middle of this machine a stove was placed, with large balls of clay on the top to retain the heat, and two pounds of charcoal every six hours was a sufficient supply of fuel for heating it. The eggs were deposited in flat osier frames holding 300 each, and laid on iron rods radiating (like the spokes of a wheel) round the stove, and attached to hooks in the ceiling; on each basket was a label, containing the date when the incubation of that particular one commenced. The object of having the cords was to elevate the baskets farther above the stove, or to change their relative positions when a diminution of heat was necessary, which Dubois found to be the case in this machine about the twelfth or thirteenth day.

Bonnemaine endeavoured to improve upon all these contrivances; and he framed, in consequence, a machine, more complicated, but more easily regulated, than any of the others. But it is quite unnecessary to give any exact description of it. The advantages which it is said to have possessed are, 1*st*, The preservation of uniform heat; 2*d*, Moisture like that communicated by the natural mother; 3*d*, The ready application of this dampness to the surface of each egg, so as to influence the embryo within; 4*th*, The avoidance of such evaporation of the internal fluid, as would render difficult the evolution of the chick from the shell, which is always the case when the white, from any cause, becomes dry and gluey.

Even in the most successful of all these instances of French ingenuity and perseverance, the artificial method has not succeeded in a degree commensurate with the expense and difficulty of producing chickens, and still less with that of the cost of *rearing* them.

In Egypt, the *climate* does part of the work in the first respect,—the development of life, and more than half in the rearing of the birds. The women, who receive hundreds of chickens in exchange for their eggs (in the proportion already stated, sooner or later after their liberation from the egg, according to their strength), take them to the flat roofs of their houses, or detached yards enclosed with mud walls, four or five feet high, and with fine earth or sand on the floor, where they watch them during the day from the attacks of birds of prey, feeding them well with rice and millet. At night, the pullets are locked up in cages made of palm tree branches, lined with thick cloth, and containing several chambers, until they are a month old, when they are transferred to the fowl-yard.

In France, where the climate is far better than ours for the purpose of rearing poultry, the difficulty of *rearing* has been considerable, that of *producing* comparatively less so. Reaumur calculated on having 96 chicks from 300 eggs; Bonnemaine had nearly as many chicks as eggs.

In the natural process of hatching, *half* is considered a fair average production, from the various accidents which occur both to the eggs and the chickens in the first fortnight; but the mortality among those artificially reared has been much greater, from the influences of climate. The French experimentalists took great pains with the rearing of their chickens. They kept them in the hatching place for some days, in a high temperature; then they formed an artificial mother, a box or cage lined with lamb's wool, and calculated to afford them, when at rest, protection and warmth similar to that of the maternal wings. Chambers, warmed by stoves, were also provided for them; and Bonnemaine took the trouble of constructing rooms, warmed by hot water introduced through pipes, besides arranging flannel at the ends, under which they nestled to warm their backs, and which, like stepmothers in general, were, we suspect, but sorry substitutes for the true parent.

The failure of so many scientific naturalists would lead us to abandon the expectation of rendering practically useful a system, which appears more suited to amuse the minds of the curious than to benefit mankind, especially where an abundance of poultry may be reared by natural means.

We do not, however, by any means, despair of seeing perfected a mode of artificial hatching, which, without the extreme labour and assiduity required in all the trials which have been hitherto made, may attain the desired end.

Mr Moubray, one of the most *practical* writers on the general subject of poultry, who tried the process of incubation by the oriental method of fire, and who had 35 chickens from 45 eggs, states, that, if there were an adequate motive, the artificial process might be conducted here with sufficient success and to the immense multiplication of domestic fowls of every description, an adequate expenditure in houses and attendants being presupposed.

Now, we conceive that there is an adequate motive for prosecuting the experiment,—that of supplying an abundant, and therefore a cheap, supply of a most delicate and nutritious food, which, from the extravagant prices required for fowls, precludes, in England, all but the very opulent from having them at their tables.

The French king, who wished that every peasant in his kingdom could have a fowl for dinner at least every Sunday, expressed a desire to which every philanthropist among ourselves would respond with sincerity; but this cannot be, without a supply incomparably greater than is at present afforded.

Before the rapid intercourse between England and Ireland, all the tribes of domesticated poultry could be had in the remote provinces of the latter country, for prices which placed them within the reach of every one. The writer of these observations has often purchased chickens for the coop, in the advanced part of summer, at 8d. per couple. The peasantry, who reared them with facility, too poor to consume them, and obliged to sell them, were content with the prices which they even then received; and *now*, they are considerably benefited by the facilities afforded for conveying this article of domestic produce to the all-devouring cities and towns of England, at prices unknown to those producers a few years ago. But all that they can supply is inadequate to the demand; and, as the great British farmer is too independent and too gigantic in his objects, to take the trouble of such petty gains as arise from the breeding of poultry, and as the British labourers are too limited in their allotments of land, too much congregated together, to permit the rearing of gallinaceous fowls without engendering perpetual disputes, there is no prospect of a great increase in the rearing of poultry in England, without some *artificial* means; for, though individuals, more as a subject of amusement than of pecuniary speculation, occasionally rear poultry by the natural method, on such a scale as proves that, by care and industry, the importation of the many millions of poultry annually brought from France would be needless, and that the flesh of gallinaceous fowls might be sold in our markets at the price of butcher-meat,—such examples are only exceptions to the general rule, which limits the class of producers to the peasantry and little farmers.

Now, taking the general average as to the broods of chickens—and to the gallinaceous tribe we confine our present observations—it is probable that not more than one-half of the chickens hatched in the ordinary way are reared for the table. Some hens break their eggs in sitting down too heavily, in changing their positions; some abandon them after a few days; some again sit so unsteadily as to addle the eggs by the alternations of heat and cold; others destroy the chicks in the birth from too great eagerness to see them out of the shells; a few have been known to eat their eggs; some smother the chickens accidentally on their coming out of their shells, and often trample them to death when scraping up food for them, or flying into a passion. Then there are risks from the hawks, foxes, rats, the *changes of weather*, and various casualties. If the *rearing* of chickens obtained by artificial hatching in large numbers can be accomplished with certainty and precision, the primary difficulty *producing* them artificially, and in vast numbers, is not by any means of a very formidable nature.

To this conclusion we are led from having observed the system of artificial heating pursued in London by Mr Bucknell, who exhibits the entire process, and chickens of different ages, and in perfect health, in little compartments of the large room in Pall Mall, where the entire system may be seen in constant operation. This appears to be a far more certain, and apparently an easier mode of producing birds artificially, than any hitherto in operation. The mode of regulating the heat is under perfect control, and though there must be numerous failures from the same causes which would apply in the natural way, such as want of impregnation in the eggs, or of vitality from staleness or ill health in the parent, which causes the embryo, after partial development, to fail before the full term, a considerable number come forth in a perfect state, and live, and fatten, and die in due course for the benefit of omnivorous man.

Mr Bucknell gives the following description of the Eccaleobion in his treatise on artificial incubation:—

"The Eccaleobion, or life-giving machine, forms, to outward appearance, an oblong square wooden box, about nine feet in length, three feet in breadth, and three feet and a half in height, covered, excepting the doors, with cloth. It stands upon a table, and is entirely disconnected from the walls against which it is placed. Its efficient action and regulative power are inclosed within. It is divided into eight compartments, or divisions, open to the sight (the doors being glazed), in which the eggs are deposited, spread promiscuously upon the floor of each division. The eggs lie uncovered, neither wrapt in flannel, nor immersed in sand, as has usually been done, in order that they might retain their warmth when exposed to cold, or resist the effects of too great heat.

"The Eccaleobion is capable of containing upwards of 2000 eggs—each egg has the power of generating heat, as the bird within it advances to maturity; consequently a very successful issue from a large number of eggs can be expected only when such quantity is subjected to an uniform action of the machine, regulated according to the degree of heat engendered by the birds. Or, in other words, the degree of temperature suited and administered to a thousand eggs during the last week of incubation, would not elicit life in a thousand fresh eggs submitted to the same influence; while the temperature necessary to produce life in the latter would destroy it in the former. The warmth imparted by the Eccaleobion is uniform and continued. A flush of fresh cool air passing over them each day, for a short time, is considered beneficial."

Of Mr Bucknell's mode of heating the machine we are ignorant; this is the only point on which he is reserved. The chicks may be seen coming forth from the shell every day in the week, full of life and energy, and in different stages of growth. But to carry the principle into any practical extent of national importance, the scale should be much increased, and due provision made for rearing and fattening the pullets. This is apparently the only serious difficulty. *Artificial mothers*, in Mr Bucknell's opinion, are useless where large numbers exist; the chickens are crushed by each other, and the purpose at best is but imperfectly answered, as proper temperature in large and convenient compartments until they are strong enough for removal is found sufficient. Nor do they seem to require any instruction from the mother; instinct quickly teaches them all they require, or if example be necessary for them, that other chickens supplies the deficiency: these often at the age of two months take pleasure in brooding the younger birds, and as Mr Bucknell remarks, "Though probably it is the pleasurable sensation derived from the warmth communicated by the young birds nestling under them, which induces them to do it, it is nevertheless a striking and highly interesting picture to witness these mimic mothers acting the part of foster parents with so much apparent satisfaction, yet with the awkwardness with which a girl in similar circumstances fondles her doll."

Gallinaceous fowls are uncommonly productive, and the number of eggs which, according to the bountiful provision of Providence, is produced by the *domesticated* kinds, which (unlike those in a state of nature) lay considerably more than they can hatch, is an assurance that the supply of fertile eggs for artificial incubation to any extent might be obtained.

Some instances* of the fecundity of hens are before us.

Produce of three hens (two of them more correctly pullets), from the 6th of May to the 6th of November, 343 eggs.

Produce of three Poland pullets, hatched in the preceding June, from December 1. 1835 to December 1. 1836, viz.:

1835,	December,	12
1836,	January,	50
	February,	48
	March,	50
	April,	54

---

* See Labourers' Friend Magazine.

1836, May,	55	
June,	56	
July,	55	
August,	55	
September,	55	
October,	25	
November,	9	
		524 eggs.

An illimitable supply of fertile eggs might be raised without difficulty by ourselves, and for the mere purpose of egg-eating. The continent, which supplies more than seventy millions a year, would still be a sure resource for the general markets, if they cannot be supplied at home.

Buildings, both open and enclosed, in dry and warm situations, and admitting of healthful exercise, arranged on a sufficient scale, and constructed for artificial warmth, are the principal *desiderata;* the temperature in each should be accommodated to the respective ages of the birds until they can be gradually habituated to the external atmosphere, if they be designed for mature life, and the internal arrangement of these buildings should be suited to the habits of the different species of birds to be reared, whether to turkeys, geese, ducks, chickens, pheasants, or partridge, and each species separated from the others, with sufficient space for exercise.

Mr Bucknell states that heated apartments would not answer for the young birds, which would die from cold and cramp when afterwards turned out of doors. He objects also to steam or hot water-pipes, from the irregularity of temperature which they occasion, while he asserts that the application of the principle of the Eccaleobion machinery to rearing will insure health.

Superintendence also would be very easily discharged; one person could as easily manage thousands of birds, properly classed, as a single brood on a cottage floor, where there is constant need of care, and anxiety to guard from injuries; and we are inclined to think that there is much more loss of life and health from atmospheric variations, and their consequent influences, than would arise on the ground of constitutional delicacy in birds reared in artificial warmth.

We have been at pains to ascertain whether chickens hatched in the Eccaleobion, and removed at different ages, have proved healthy, or have been reared with difficulty. The replies to our inquiries, from individuals whose names and stations are in themselves a sufficient guarantee for the correctness of their opinions, are decidedly favourable, and the average of loss by ailments among the poultry reared by Mr Bucknell is less than that sustained by the ordinary practice, in consequence of casualties and variations of weather.

It may be said, Why have the French abandoned the prosecution of their experiments on these subjects? and if artificial incubation has failed in a country so remarkable for attention to the rearing of poultry, and in a climate so much more favourable to the purpose than that of Great Britain, how can success be expected in the latter country? In the first place, Mr Bucknell has greatly improved upon the experiments of the French *savans*, and ensured greater accuracy of detail, the French plans being by no means practicable ones; and, in the second, the inferiority of the climate of Great Britain is the very reason why the artificial method is more desirable for us than for our Gallic neighbours, who need it not so much. If Mr Bucknell's system, on a great scale, should be found expedient here, it will soon be adopted by our ingenious neighbours; for though poultry be abundantly produced in France by the natural method, this excellent and nutritious food is not within the reach of the poor operative mechanic or the farm-labourer there more than here, and no class of consumers would object to have two birds for one at present supplied, and at half the present price. The expense in winter would, of course, be greater than in summer, but the profit would probably be commensurate, if eggs could be then obtained in sufficient numbers.

The concluding observations of Mr Bucknell, in his interesting pamphlet, fairly express the opinion which we ourselves are disposed to hold.

> "All circumstances considered, it would be found that a considerable capital would be required, and to be judiciously expended, before artificial incubation and rearing could be placed upon a basis sufficiently extensive to render it profitable, and which can only be done upon the principle of producing quantity, so that the necessary expenses shall be divided over a large number. This accomplished, the reward would be highly lucrative."

JETHRO TULL AND HIS HUSBANDRY.

By Cuthbert W. Johnson, Esq.
Corresponding Member of the Maryland Horticultural Society.

The science of agriculture, although the first in importance to mankind, is yet remarkable for the few great names whose discoveries or general abilities adorn its history. For an explanation of this fact, we must in some measure be contented with the common observation that its advances, its improvements, are so slow, as to be almost imperceptible; are dependent upon many difficult circumstances; and much more tedious in its experiments than any other science: for instance, it is true that many, very many of the processes, daily witnessed and carried on by the cultivator, are based upon chemical principles, and may be illustrated, and very materially assisted, by chemical experiments. But those who have studied the science the most carefully are fully aware that no experiments upon the laws of dead matter even nearly equal in difficulty those upon living substances, for these last, in many instances, seem endowed with powers which completely neutralize and overcome the very principle of chemical attraction and repulsion. Such experiments, too, are not like those made in the philosopher's laboratory, secure from interruption, and carefully and readily guarded from every source of error; on the contrary, those of even the most scientific, the most careful cultivators, are of necessity liable to many accidents, are ever the sport of the winds and the weather, require months to complete, and often the duration of a life to repeat and firmly establish. Then, again, to add to the difficulty of such investigations, there are hardly two soils to be found in the kingdom, whose composition is even nearly the same. All differ either in the proportion of some ingredient, in climate, in declination, or in the nature of their substrata; the variations in their treatment, therefore, must often be as different as their numerous varieties. Thus encircled with difficulties, requiring, for the attainment of considerable eminence, the union of both practical experience, patient and long-continued research, and scientific knowledge, we need hardly feel surprised, that those who have made important improvements in agriculture have been but few in number, and that these illustrious exceptions to the general rule have appeared at very distant intervals. The farmer, too, however skilful and successful in his business, however industrious and talented, is but rarely induced to describe the improvements he has caused, or the implements he has improved or invented ; he is too often content with the profit derived from his own ingenuity, and too frequently lets others reap all the honours of discoveries to which he is more justly entitled.

In the list, however, of distinguished English farmers, Jethro Tull, the chief subject of this little essay, presents us with a highly honourable exception to the general rule ; for he, utterly regardless of all selfish considerations, not only made great and successful efforts for the promotion of agriculture, but he made those valuable researches publicly known, in a work entitled, " The Horse-hoeing Husbandry," which will hand him down to all after ages, as one of the chief of English farmers—as a patriot who, undaunted by the natural difficulties of the attempt, attained great and important advances in the cultivating and increasing the fertility of the land, and in enlarging the resources of the followers of a business to which he was not originally bred. For, as we shall presently see, Tull became a farmer, not from inclination, but from the effects of a sickly constitution and a diseased frame.

The life of Jethro Tull will, indeed, well repay the careful and often repeated study of the English farmer, in more ways than one ; will afford not only instruction, but encouragement to him who has to contend against the poorest soils, the most adverse of circumstances ; for, if such a cultivator holds a poor, thin, hungry soil,—so did Jethro Tull. If he farms in a remote and desolate district ; if he has ignorant and obstinate labourers ; if he is visited by sickness ; if he is almost driven from his profession by even incurable diseases,—so, let him be assured, was that great farmer whose labours are the subject of this memoir. The dauntless intrepidity, and perseverance too, of Tull, should always be remembered to his honour. Knowing, as he did, the correctness of the principles for which he so nobly contended, he never relaxed in his endeavours to induce their general adoption ; and if it was only after the lapse of many years, when Tull had long been in his grave, that those principles and those mechanical inventions for which he so energetically contended were commonly adopted, the fault was not Tull's, but must be attributed to the ignorance and the apathy of the age in which he made his important, his ill-requited, discoveries.

The present time seems rather appropriate for taking a review of those great services and discoveries of the Tullian system, and the doctrines which Tull advocated; for this is not only a period when the true spirit for all agricultural improvements is nobly excited; but this year (1840) is the centenary anniversary of his death. If any illustration were necessary of the truth that it is only with extreme difficulty that agricultural improvements are introduced, it would be found in the fact, that many of those undoubted improvements, which Tull either made, or first introduced into general notice, are still only partially adopted, and in some districts as little employed as if the discovery of the drill had been first announced at the last Cambridge meeting of the Royal Agricultural Society of England; or the Horse-hoe first found but recently amongst the native cultivators of New Zealand.

The debt of gratitude which all modern farmers owe to Tull is indeed a large one; he was the first who boldly and zealously contended for the adoption of improved machinery in all agricultural operations,—the ploughs which he depicts in the engravings which accompany his Horse-hoe Husbandry, have not been very materially improved in the last century. He invented several varieties of hand and horse hoes. He was very nearly, if not quite, the first who produced a practically useful drill. He shared the fate of all those who, as discoverers, have the temerity to disturb old systems. He was regarded by the bulk of his contemporaries as an idle, restless innovator. He was ridiculed, thwarted, and opposed in every way, not, as might have been reasonably expected, by the most ignorant, but by those who either did know, or ought to have known, better things. His neighbours regarded him as almost a lunatic, and the tradition of the neighbourhood of Shalborn still is, that he was even wicked enough to attempt to banish the flail from his farm, and that he had a machine in his barn at Prosperous, which worked a set of sticks so readily, as to thrash out his corn without the assistance of the labourer. This, there is little doubt, was an attempt to construct a thrashing machine, and that it was, in those quiet days for agriculture, regarded as a wonder, is proved by the existence of the tradition. When thus located in a remote rural parish, on the borders of the counties of Berks, Hants, and Wilts, Tull wrote his "Husbandry," a book which is not nearly so well known as it ought; for, though the progress of science has rendered a considerable portion of Tull's writings obsolete, yet much, very much, yet remains unaltered by the progress of discovery, to amply repay the farmer for a careful and often repeated perusal.

Tull wrote with all the modesty and diffidence of genius: he tells us in the preface to his Husbandry, that he knew that he had undertaken a task of which he was incapable, and that it was produced during a long confinement within the limits of a lonely farm, in a country where he was a stranger. And when we remember that he was through life an invalid,—obliged to abandon his sedentary profession of the law, and seek for health by foreign travel, and by country pursuits,—when we think of these things, we cannot but still more admire the energy of mind he betrayed, and the difficulties he overcame. He feelingly alludes to some of these, when he says, with regard to his great work—"'Tis no wonder that the style is low as the author, or as the dust that is here treated of, since the whole was written in pains of the stone and other diseases as incurable and almost as cruel; but fine language will not fill a farmer's barn." Every thing connected with the history of this great benefactor of agriculture, must be interesting to the cultivators of this and all other countries. I regret that, with some industry, I have not been able to obtain for the farmer more information with regard to him. He was born in Oxfordshire, on his paternal estate. He was educated for the legal profession, became a Member of Staple Inn, and was called to the Bar, on the 11th of December 1693, by the Benchers of Gray's Inn, and not at the Temple, as is commonly asserted in the biographical dictionaries. He was afflicted, soon after his call to the Bar, with a pulmonary disorder, and, in consequence, abandoned his Oxfordshire farm, and for some time travelled on the Continent. He was, for a considerable period, at Montpelier in the south of France. Returning to England, he took into his own hands the farm called Prosperous, at Shalborn in Berkshire, where, again resuming those agricultural efforts which he had commenced in Berkshire, he wrote his Horse-hoe Husbandry.

During his tour on the Continent, Tull carefully compared the agriculture of France and Italy with that of his own country, and omitted no occasion to observe and note every thing which supported his own views and discoveries. He particularly, on more than one occasion in his work, alludes to the similarity of the practice followed by the vine-dressers of the south of Europe, in constantly hoeing, or otherwise stirring their ground, and his own horse-hoe husbandry. Finding that they did not approve of dunging their vineyards, Tull readily adduced the fact in favour of his own favourite theory, that manuring a soil is an unnecessary operation.

After Tull's decease, his lands in Berkshire found their way into Chancery, and were sold by order of the Court in 1784 to Mr Blandy, the father of the present owner. It consists of about seventy acres of freehold land, but Tull held about 130 acres in addition by a different tenure. The house in which he dwelt has been modernised, but the old-fashioned brewhouse yet remains as Tull had it, and when I visited Prosperous in July 1840, was still in very good condition. Of the out-houses, Tull's granary, and his stables, are yet in existence, though fast verging to destruction; and at the end of this granary, which Tull built, is an old well in which, when cleared out some years since, was found, deep buried in the accumulated mud of nearly a century, a three-pronged hoe, which there is no doubt belonged to Tull. Into this well it was most likely thrown by his men, who, adopting the use of his new tools with the utmost reluctance, annoyed him in many ways. Against these he declaims with much bitterness—“ 'Tis,” he says, “ the most formidable objection against our agriculture, that the defection of servants and labourers is such, that few gentlemen can keep their lands in their own hands, but rather than make nothing of them, they let them for a little to tenants who can bear to be insulted, assaulted, kicked, cuffed, and Bridewelled, with more patience than gentlemen are endowed with." This burst of feeling would very clearly intimate the probable truth of the case—that Tull was energetic and irritable—that his servants pillaged and annoyed him—and that he did not submit to their impositions without struggling against them in a way which his legal education should have taught him to avoid.

Such was the spirit of enterprise, and such was the genius of Tull, that no difficulties, however formidable, stopped him in his researches. His experiments carried on in his garden and in his house, with regard to the food and the habits of plants, some of which he gives in the first pages of his work, betrays the thirst for knowledge, the industry, and tact, which he possessed.

The tradition of his neighbourhood is, that, when confined to his room and to his couch by his incurable maladies, he yet managed to carry on his experiments on vegetation, by having large boxes and garden-pots of earth placed in his room, and before his windows, where he sowed his seeds, and watched their progress under different modes of cultivation, with all the zeal of a martyr, and the enthusiasm of an inventor. He is still spoken of by the old labourers of that district, as being a man whom it was impossible to oppose in any of his plans, with eventual success. He was evidently the wonder of his neighbours, who would, perhaps, have regarded him as a magician, if the age of witchcraft had not then been nearly if not quite over. It would seem, from what Tull says (p. 50), that it was in 1701 that he constructed his first drill for planting sainfoin. And the occasion of his doing so he thus describes in his preface. " It was very difficult to find a man that could sow clover tolerably; they had a habit (from which they could not be driven) to throw it once with the hand to two large strides, and go twice on each cast; thus, with nine or ten pounds of seed to the acre, two-thirds of the ground was unplanted, and on the rest it was so thick, that it did not prosper. To remedy this, I made a hopper, to be drawn by a boy, that planted an acre sufficiently with six pounds of seed; but when I added to this hopper an exceedingly light plough, that made six channels eight inches asunder, into which two pounds of seed to an acre being drilled, the ground was as well planted. This drill was easily drawn by a man, and sometimes by a boy."

Jethro Tull's great improvements in tillage consisted in the use of his drill, and in the adoption of such wide intervals between his rows of turnips (several feet, three to six), that the horse-hoe could be easily and constantly employed. He ridiculed, very justly, the delusions under which the farmers then laboured with regard to the unvaried advantages of thick sowing. He told them that they "did not grudge to bestow three or four pounds in the buying and carriage of dung for an acre, but that they thought themselves undone if they afforded an extraordinary eighteen-pennyworth of earth to the wide intervals of an acre, not considering that earth is not only the best, but also the cheapest entertainment that can be given to plants." And again, in another place (p. 32), he told the thick-sowing broad-cast cultivators of those days, what must have not a little astonished them, "that every row of vegetables to be horse-hoed, ought to have an empty space or interval of thirty inches on one side of it at least, and of nearly five feet in all sorts of corn;" and he was very justly suspicious, that what he was going to advance "would seem shocking to them before they have made trials."

Tull was the first English farmer who advocated to its fullest extent the decided advantages of constantly pulverizing and stirring the soil, to illustrate which almost all his experiments were directed. His explanations, however, of his own discoveries, were not always so good as the object he had in view, although there is little to find fault with in his theory of the advantages of tillage. "I have had," he says (p. 24), "the experience of a multitude of instances, which confirm it so far, that I am in no doubt that any soil, be it rich or poor, can ever be made too fine by tillage; for one cubical foot of this minute powder may have more internal superfices, than a thousand cubical feet of the same or any other earth tilled in the common manner; and I believe no two arable earths in the world do exceed one another in their natural riches twenty times; that is, one cubical foot of the richest is not able to produce an equal quantity of vegetables, *cæteris paribus*, to twenty cubical feet of the poorest; therefore, it is not strange that the poorest, where, by pulverizing, it has obtained one hundred times the internal superficies of the rich untilled land, should exceed it in fertility; or, if a foot of the poorest was made to have twenty times the superficies of such rich land, the poorest might produce an equal quantity of vegetables with the rich. Besides, there is another extraordinary advantage when a soil has a large internal superficies in a very little compass; for then the roots of the plants in it are better supplied with nourishment, being nearer to them on all sides within reach, than it can be when the soil is less fine, as in common tillage, and the roots in the one must extend much farther than in the other, to reach an equal quantity of nourishment; they must range and fill perhaps above twenty times more space to collect the same quantity of food. But, in this fine soil, the most weak and tender roots have a free passage to the utmost of their extent, and have also an easy, due, and equal pressure everywhere, as in water."

He did not confine his attention to the advantages of thoroughly pulverizing the land—he was also an advocate for much deeper ploughing than was usual in his time, and in one or two places laments the supineness of the farmers in this respect, and the idleness of the ploughmen, in only half penetrating the soil, for fear of injuring the appearance of their horses. And he illustrated the advantages of his proposed mode of ploughing by the best means in his power, not only by general observation, but by also appealing to several very ingeniously contrived little experiments upon the habits of plants.

Tull saw very clearly, that this theory of the advantages of pulverizing and deepening soils would be strongly supported if it could be shewn that the roots of the commonly cultivated grasses would, under favourable circumstances, penetrate to more considerable depths than the ordinary shallow soils of the farmer allowed them. He paid therefore considerable attention to the roots of plants, not only in his small experimental glasses and pots, but in his fields. He found, by some observations on the roots of some wheat plants growing in a deeply loosened soil, that their roots had penetrated to more than double the depth of the commonly ploughed land of the farmer; and all this I can support from my own observations on the roots of the crops, growing on the edge of chalk and loam pits, and in other situations where the soil has been loosened to great depths. Tull, too, noticed the very considerable and rapid extension of the roots of trees, growing near to old dunghills, sewers, &c., and he hence adduced another argument in favour of the advantages which are derived from assisting, in the best ordinary way then known, the roots of plants to penetrate deeper into the soil. Had Tull lived in our days he would have been an ardent advocate for the subsoil and subturf ploughs. He would not then have confined his efforts to the increased use of the common plough and the trenching spade.

A century has now elapsed since Jethro Tull thus earnestly endeavoured to draw the attention of the farmers of England to the importance of deepening, pulverizing, and mixing their soils. Tull, unfortunately for himself, lived an age or two too soon, had to encounter the ignorance and the obstinacy of his workmen, the apathy of his neighbours, the ridicule of those who understood him not, and the anger of the indolent. The principles, however, which he inculcated have survived and overcome all these obstacles, are yearly more prized because better understood. Tull thought that the earth, and the earth alone, did every thing for vegetation; astonished at the effects which were produced by merely deepening and pulverizing, he allowed his enthusiasm to carry him too far. " Every plant," he tells us, " is earth, and the growth and true increase of a plant is the addition of more earth;" and in another place he adds, " too much nitre corrodes a plant, too much water drowns it, too much air dries the roots of it, too much heat burns it; but too much earth a plant never can have." Thus impressed with the value and the all sufficient powers of earth to support vegetation, it need hardly surprise us that Tull soon came to the conclusion, that, under a proper management of the plough and the scarifier (for a rude instrument of this kind was known in Tull's days), the land might be so pulverized and deepened as to bear its crops, without the addition of any decomposing manures.

Tull deceived himself in this instance, by not attending to the quantity of finely divided, slowly decomposing substances, which all cultivated soils contain in some shape or other. By ploughing and pulverizing, the progress of the putrefaction of these organic matters was accelerated, they were rendered more soluble, and then the succeeding crop was, by their decomposition, sufficiently nourished. But these operations could not be long continued; at each repetition of the experiment, the amount of the stubborn, slowly decomposing matters of the soil became reduced, and, in consequence, the crops produced under the system became less. Tull's farm at Shalborn was well adapted to try the effect of this theory,—it is situated on the crown of a rising ground, whose thin-skinned-soil is a light loam mixed with gravel resting on chalk; of such a soil the organic matters of necessity are speedily exhausted by cropping and pulverizing. Tull soon found this out; he struggled hard against the necessity, but he finally had recourse to the employment of manures; he found at last, that, however valuable good tillage is to the application of fertilizers, it is utterly incapable of supplying their place. The failure of Jethro Tull, therefore, in this great effort was complete; but it was the failure of a man of genius. He tardily admitted the value of dunging the land, but he still explained its operation in such a way as still to refer all the benefit to the earth, when he told the farmers of those days, "its use is not to nourish but to dissolve, that is, divide the terrestrial matter which affords nutriment to the mouths of vegetable roots." To a very considerable extent Tull was correct in this explanation of the mode in which common manure operates in rendering the soil more fertile, for it renders the land more pervious to the atmospheric gases and vapour, and, in consequence, all vegetation growing upon the land is better nourished. But the benefit, as Tull imagined, does not end here; the organic matters of the compost, as they slowly dissolve in the soil, gradually give out a considerable proportion of various gases, such as carburetted hydrogen and carbonic acid gas, all of which are absorbed by the plant at the moment of their extrication, enter into new combinations, and promote its vigorous growth. That this is not a merely mechanical advantage is proved in several ways; for instance, the benefit of the application of the decomposing compost is proved to be just as advantageous in some instances to the crop where it is not even mixed with the soil. This is shewn by the effect (known to every gardener) which is produced by placing the manure in a chamber beneath the soil, so that the roots of the plants neither mix with nor does the soil even touch the compost. The gases of putrefaction, however, arise and mix with the soil, and the most luxuriant effects are produced without any division of "the terrestial matter," which Tull imagined to be so essential to the explanation of the phenomenon. We need not search in the works of Tull for any attempts to use the drill for the application of fertilizers, for all Tull's efforts were directed to cultivate the earth without manure of any kind. He admitted the necessity of using it at all only with extreme reluctance: he told his reader seven years before his death, that "the particular scheme of raising constant annual crops of wheat without dung or fallow is as yet only upon probation, but, by six crops I have had in that manner, I see nothing against their being continued. This, it is true, requires greater care in their management than any other branch of the husbandry, but he who can do this without dung or fallow may easily do it with one or both of them; and there may be such wet clayey land which the plough cannot well pulverize, without help of the ferment of dung."

Tull, in fact, let no opportunity escape him to decry the ill effects of employing dung. Modern gardeners would be astonished at his zeal when he contends for its banishment from the kitchen garden. "There is," he says, (p. 18), "much more reason to prohibit the use of dung in the kitchen garden, on account of the ill taste it gives to esculent roots and plants, especially such dung as is made in great towns. It is a wonder how delicate palates can dispense with eating their own and their beasts' ordure but a little more putrefied and evaporated, together with all sorts of filth and nastiness, a tincture of which those roots must unavoidably receive that grow amongst it. Indeed, I do not admire, that learned palates, accustomed to the gout of silphium, garlic, and mortified venison, equalling the stench and rankness of this sort of city muck, should relish and approve of plants that are fed and fattened by its immediate contact. People who are so vulgarly nice, as to nauseate the modish dainties, and whose squeamish stomachs even abhor to receive the food of nobles, so little different from that wherewith they regale their richest gardens, say, that even the very water wherein a rich garden cabbage is boiled, stinks; but that the water wherein a cabbage from a poor undunged field is boiled, has no manner of unpleasant savour; and that a carrot bred in a dunghill, has none of that sweet relish which a field carrot affords. Dung not only spoils the fine flavour of these our eatables, but it spoils good liquor. The dunged vineyards in Languedoc produce nauseous wine, from whence there is a proverb in that country, that poor people's wine is best, because they carry no dung to their vineyards." Our author, however, had a better opinion of vegetable manures than those of animals, for he says, "Vegetable dung, unless the vegetable be buried alive in the soil, makes a much less ferment in it, and, consequently, divides it less than animal dung does. But the dung of vegetables is much more wholesome for the use of edible roots and plants, than that of animals."

Jethro Tull, according to Chalmers, died at his house at Prosperous, January 3. 1740. Of his works and inventions of agricultural machinery, I have already spoken. Five chapters of his only work that I am acquainted with, "The Horsehoe Husbandry," was published in folio in 1731,—the chief volume in 1733, and in the same year, some additions were printed which are not found in many of the copies of that year, or even in that of 1751. Cobbett, however, was careful to add to it an octavo edition which he printed in 1829. In this, he omitted only the plates of the ploughs and other agricultural implements; but he added an introduction, in which he did little except laud Tull, and vituperate those who had adopted Tull's plans, without acknowledging the source of their obligation; not remembering that many a Tullian improvement has been often made since our author's time, by plain practical farmers, who never even heard the name of Tull mentioned.

Tull, as I have before remarked, published his "addenda" to his husbandry in the same year that the first edition appeared; in these he takes more notice than was perhaps necessary of certain attacks which had been made upon his book, by the members of a certain "equivocal society," amongst whom was the celebrated Stephen Switzer, the most talented seedsman, gardener, and horticultural author of his day. It appears, too, that a society of gentlemen in Dublin had, without his leave, reprinted for distribution his five "specimen chapters," all of which annoying circumstances evidently irritated him; besides these controversial notices, and certain corrections of the errors made by the printer, the long addenda do not contain any thing very valuable. Time has settled pretty well the respective merits of the contending parties; the fame of Tull is still steadily increasing, while the name and works of even the classical, the elegant Switzer, are much too little known amongst modern cultivators.

Twenty-four years after the death of Jethro Tull, a paper appeared in the Gentleman's Magazine, vol. xxxiv. p. 522, dated at Hungerford, about four miles from the farm where he lived and died, and signed with the initials D. Y., which details almost all that is known of the life of the great introducer of the drill system. It was written by one of his neighbours, who had known and associated with him, and valued very properly his services in the cause of agriculture. He describes in that essay the sensation produced by the unheard-of attempts of Tull. He says, " Novelty always excites curiosity—many gentlemen came from different parts on the fame of this new method of farming, some of whom were persuaded by the weight of Mr Tull's arguments, to go hand in hand with him in the course of his experiments, while others, who thought themselves more wise, and more discerning, took every occasion of ridiculing the practice, and of representing it as a fanciful project that, after a great expense, would end in nothing but the ruin of the proprietor. In general, the whole body of farmers and husbandmen pronounced the man as a conjuror, who, by sowing a third part of his land, would make it produce a quantity equal to that of sowing the whole."

The opposition which Tull experienced from his servants, and the difficulty of training them, is well described by the same contemporary author. He tells us, that " while the project engrossed the conversation of the neighbourhood for many miles round, Mr Tull employed himself assiduously in training of servants, and in accommodating the instruments proper for his new husbandry to their limited capacities. And this work he found much harder to accomplish than he at first expected: it was less easy to drive the ploughman out of his way, than to teach the beasts of the field to perform the work. The late Lord Ducie Moreton, who followed Mr Tull, or rather accompanied him, in this laborious and vexatious business, has very frequently, if I have been rightly informed, to correct the awkwardness of his ploughmen, or to overcome their obstinacy, stript himself of his dignity, and put his hand to the plough himself; and yet, with all this condescension in his Lordship, and with all the vigilance, activity, and ingenuity of Mr Tull, who was a most excellent mechanic, they were both forced at last, after much money expended to very little effect, to relinquish the project, and to content themselves with farming their lands in the ordinary way, except some small portions of it, which they reserved for further experiments. The writer of this," he continues, p. 632, " was personally acquainted with Mr Tull, has often heard his complaints, and cannot now forget a usual saying of his, that there is more than a rent odds in saying to the husbandmen, ' Go do this or that, or come let us do it.' And he takes upon him to assert, that he never heard Mr Tull, in private conversation, mention his new husbandry, without expressing, at the same time, his sense of the difficulty attending the due execution of it."

I have already, at p. 146 of this volume, alluded to Jethro Tull's services with regard to the drill—its improvement, and its general introduction to the notice of the farmer. He must not, however, be regarded as its absolute inventor, and it was certainly not Evelyns, who very complacently took all the merit of the invention to himself; for a rude machine of this kind was known long before Tull's time, which was first introduced into this country from Spain, is mentioned in one of the early volumes of the Philosophical Transactions as the Spanish Sembrador,* and is particularly described by John Worlidge, in his Treatise on Husbandry, which was published in 1669. Worlidge, too, particularly alludes to the usefulness of this machine in the application of manures, a purpose to which it was only commonly applied after the lapse of many years, and by very slow advances.

In alluding to those who have successfully exerted themselves in the introduction of the drill husbandry, we must not forget the great services of Lord Leicester, for, till his time, the drill was only employed by the few. It was only the most scientific cultivators who ventured to use it. By Lord Leicester's example and exertions—by the spirit of agricultural inquiry which he induced, the drill became an object of the first importance to the English farmer. But, notwithstanding the extension of its use and improved modes of construction, much yet remains for the maker to accomplish, so as to enable the cultivator to apply by the drill not only the most finely divided concentrated fertilizers, but those of a coarser and poorer description. I have, in the last number of this Journal, dwelt at some length upon the importance of this investigation. It is a question which can hardly be too often brought before the farmer and the mechanic, since fresh facts in support of the extended use and improvement of the manure drill are continually arising. In the last number of the Journal of the Royal Eng. Ag. Soc. p. 416, will be found some successful experiments by Mr Miles upon turnips, in which only thirteen bushels per acre of Poittevin's preparation of nightsoil powder, was found amply sufficient to produce the most luxuriant effects. And the Essex farmers, now that their favourite manure sprats have so materially advanced in price (owing to the extensive demand for them by the Kentish hop planters), with great success are adopting the plan of reducing the quantity usually applied more than one-half, by merely mixing these fish, or the "five fingers," with about twenty-five bushels per acre of finely divided mould, or a mixture of finely sifted loam and saw-dust, or loam and chalk, and suffering the well-mixed earth and sprats to remain and gradually dissolve for two or three weeks before it is used, in a dry shady place. It is not essential to the successful application of these mixtures by the drill, that the compost should be so dry as is commonly believed. The best constructed drills will distribute evenly almost the very wettest manures, provided those substances are properly divided. Still greater improvements are yet to be made in this respect, so as to enable the cultivator to drill the very coarsest fertilizers. And it was not long since that I was shewn by Mr Alderman of Kintbary, in Berkshire, only two or three miles from the "Prosperous Farm" of Tull, a manure drill, which he has very materially improved, both in its efficacy and simplicity of construction, that is used by him to drill *liquid* manures. It is very desirable that our leading agricultural machine-makers should turn their attention to a machine of this kind; for in this way the most powerful, and the most evenly and easily drillable of manures would be readily procured in abundance by the cultivator, in many situations where, at present, he cannot obtain them in quantities sufficiently divided to pass the drill. Not only may, in this way, mechanically suspended organic matter, such as the gulle, or liquid manure of Flanders, be beneficially added to the land, but these may, in many cases, be readily and economically mixed with saline, or even very finely diffused earthy, matters, with decided advantage. The artificial enriching mixture may, in this way, be in many situations made in the field, and the expense of carriage either very materially reduced or altogether avoided.

---

* Vol. v. p. 1086.

The farm of Jethro Tull will ever be an object of interest to the lover of agriculture. Arthur Young made a pilgrimage to Prosperous, and William Cobbett did the same. More persons would visit it, if they knew where it was to be found. To such it will be interesting to know that the rural parish of Shalborn is situated under the Coomb Hills, about four miles south of Hungerford; that the roads are tolerable, and the present holder of the farm obliging, and not insensible of Tull's great merits. If Tull was deceived in his belief in the powers of the plough to render the soil fertile without the assistance of manure, he was yet fully justified in almost every thing that he predicted, with regard to the advantages of thoroughly pulverizing and increasing the depth of the soil.

"The difference betwixt the operation of the spade, and that of the common plough," he observes, "is only this, that the former commonly divides the soil into smaller pieces, and goes deeper;" and he adds, "how easy and natural it is to contrive a plough that may equal the spade, if not exceed it, by going deeper, and cutting the soil into smaller pieces than the spade commonly does." The explanation, too, which Jethro Tull gave of the advantages or theory of deep ploughing was excellent, considering the chemical knowledge of his days; for the modern cultivator must remember that, in his time, the composition of the atmosphere was almost entirely unknown. Tull could not have known any thing of the three gases, nitrogen, oxygen, and carbonic acid, of which it is now found to be constituted, and of the existence of its insensible aqueous vapour he was equally unacquainted; he did not know how important these are to the roots of plants, and how the access of them all is naturally promoted by pulverizing the land on which they vegetate. But though Tull did not know these things, yet it is certain that he had carefully observed many facts, which proved that vapour was absorbed by the soil, and that this absorption was promoted by pulverization. "To demonstrate," he says (pp. 27, 28), "that dews moisten the land when fine, dig a hole in the hard dry ground, in the driest weather, as deep as the plough ought to reach; beat the earth very fine, and fill the hole therewith; and after a few nights' dews, you will find this fine earth become moist at the bottom, and the hard ground all round will become dry. Till a field in lands—make one land very fine by frequent deep ploughing, and let another be rough by insufficient tillage alternately, then plough the whole field crosswise in the driest weather, which has continued long, and you will perceive, by the colour of the earth, that every fine land will be turned up moist, but every rough land will be dry as powder from top to bottom. In the driest weather, good hoeing procures moisture to roots; though the ignorant and incurious fancy it lets in the drought, and therefore are afraid to hoe their plants at such times."

These enlightened observations of Tull have been verified and illustrated by the progress of agricultural discovery, by the improved modes of practice adopted by modern farmers, and by the march of chemical philosophy. Evelyn had observed the advantages of continually keeping the ground of fruit-orchards hoed or dug. Sir Henry Stewart attests, with Sir Walter Scott, Withers, and a hundred others, the same fact, as applicable to timber plantations. The farmers of even the most sandy soils of Norfolk, on the very same principle, keep the ground between their rows of turnips constantly stirred, just as Tull proposed and practised a century since. And when, long after Tull was in his grave, Dr Priestley discovered the oxygen gas of the atmosphere, it was soon found that its presence was essential to the growth of plants; that it was highly grateful to the roots of plants, either when applied to them in its simple state, or when combined with the aqueous matters of the atmosphere; and that this application was very sensibly indeed promoted in either form, by increasing the finely divided state of the soil; and, further, that without this division of its particles, the earth was totally incapable of absorbing either the necessary gases or the watery vapour.

The subsoil plough of Mr Smith of Deanston, and the subturf plough of Sir Edward Stracey, which have both proved so successful in our days, only illustrate the truth of Tull's principles and Tull's sagacious observations. Tull was an advocate for deep ploughing, and for internal pulverizations,—he did not, it is true, see the necessary limits, on ordinary soils, and with common ploughs, to the realization of this theory,—he forgot that the inert nature of many substrata would render it impossible to bring them at once to the surface; but though he omitted to take this into his calculation, yet still he argued correctly enough, when he so strenuously urged his brother farmers to increase the depth of their soils by every practicable means, to let in the air to the roots of their crops, and to give every facility possible to the growth of the roots of the plant; for, by so doing, he very plainly told them they derived benefits which exclusively belong to the vegetable world. " There is yet," he said (p. 28), " one more benefit hoeing gives to plants, which by no art can possibly be given to animals; for all that can be done in feeding an animal is, to give it sufficient food, at the time it has occasion for it; if you give an animal any more, it is to no manner of purpose, unless you could give it more mouths, which is impossible; but, in hoeing a plant, the additional nourishment thereby given, enables it to send out innumerable additional fibres and roots; so that hoeing, by the new pasture it raises, furnishes both food and mouths to plants."

To every agricultural operation, in fact, of a mechanical nature, Tull's genius was admirably adapted; his ploughs, his hoes, his drills, were all of a description far superior to those of the rest of the farmers of those days. It was only where he attempted to reason upon the habits and food of plants, involving chemical truths, that Tull made great blunders. Thus believing, as he did, that earth, and earth alone, was the sole food of plants of all kinds, he ridiculed the opinion of Dr Woodward, that all the constituents of plants were conveyed to them through the agency of water. Woodward thought, very justly, " that water is only the *agent* that conveys the vegetable matter to the bodies of plants, that introduces and distributes it to their several parts for their nourishment." This theory seemed absurd to Jethro Tull, who believed that all plants fed upon the same kind of food, and that that food was earth, and only earth. It is true that Tull had a very indistinct idea that something else was requisite for the food of plants, and that certain " materials contribute in some manner to the increase of plants." And he then specifies five substances, at the head of which it is not a little singular that he places saltpetre or nitre. But how this salt operated as a fertilizer, was not at all more clear to Tull than to any who have succeeded him in the investigation. " Nitre," he says (p. 10), " is useful to divide and prepare the food, and may be said to nourish vegetables, in much the same manner as my knife nourishes me, by cutting and dividing my meat; but when nitre is applied to the root of a plant, it will kill it as certainly as a knife misapplied will kill a man. Nitre is, in respect of nourishment, just as much the food of plants as white arsenic is the food of rats." Tull, however, had a high opinion of the powers of common salt, when used as a steep for seed-corn, to prevent the smut in wheat; and he gives (p. 66) this account of the origin of the practice. "Brining of wheat, to cure or prevent smuttiness, was accidentally discovered about seventy years since, in the following manner: A ship-load of wheat was sunk near Bristol in autumn, and afterwards at the ebb tide all taken up, after it had been soaked in sea-water; but it being unfit for making of bread, a farmer sowed some of it in a field, and when it was found to grow very well, the whole cargo was bought at a low price by many farmers, and all of it sown in different places. At the following harvest, all the wheat in that part of England happened to be smutty except the produce of the brined seed, and that was all clean from smuttiness." He then gives the farmer directions for drying the brined seed, by rolling it in quicklime, just as is now commonly practised by the farmer.

Water, Tull thought, was not a food for plants, because it commonly contains earth, to which he attributed the origin of the common opinion that water is a *food* of plants. And as to air being their food, which it certainly is, Tull thought this a complete "phantasie"—quite an "airy hypothesis." In common with many of the learned of his days, Tull here strangely confused himself, by not attending to observations and experiments with regard to plants, and to these only. The merit, however, of Tull, amid his occasional mistakes, was enhanced by his modesty; and it is impossible for us, when we reflect upon the difficulties he had to encounter in the prosecution of his researches, and in the production of his book, to be insensible to his appeal, where he tells us, at the conclusion of his preface, "One cause that made the three parts of this book (that is to say, the theory, or speculative part, the practical part, and the description of the tools) the more defective was, that all three were too many for me to make perfect at once, and two would have been useless without the third; therefore it was better to give but a sketch of all than to have made any two of them never so full and perfect, leaving out the other."

Such was the modesty, such were the merits of the great father of the drill, the horse-hoe husbandry, to whose memory something, I hope, will one modern day be erected—some memorial, to indicate the agriculturist's gratitude, worthy of the English farmer. Tull lies buried without even a stone to indicate that such a benefactor of agriculture reposes beneath it. His grave is even doubtfully placed. If Tull died at Shalborn, as Chalmers asserts, he was not buried there. There is no trace of him in the parish register ; the tradition of the old people of the neighbourhood is, that he died, and was buried in Italy. His deeds, his triumphs, it is true, were of the quiet, peaceful kind, with which the world in general is little enamoured ; but their results, their value to the land of his birth, were of no mean order. His drill, his horse-hoe, have saved his country, in seed alone, the food of millions ; and when used as a distributor of manure, it has done, and it will hereafter accomplish still greater things. It has brought into cultivation thousands of acres of the barren craig, the wolds of Lincolnshire, of the deep sands of Norfolk ; and its powers are not yet nearly exhausted, for, as fresh fertilizers are discovered, the drill evenly and economically distributes them ; and as improvements in its construction are continually taking place, there is evidently much yet to be achieved by its use. The same remarks apply, in a great measure, to his hoe, and to his system of attempted cultivation without manure ; for, although the last was a complete failure, yet even this bold attempt was not unattended with benefit to agriculture ; for the farmer was hence taught, that although, by deep ploughing and complete pulverization of the soil, the use of manure could not be entirely avoided, yet that by these means a much smaller quantity was sufficient than under the old and indolent mode of tilling the land. The efforts, too, of Tull were productive of advantage in other and in indirect ways ;—his researches, his successes, his example, excited a spirit of inquiry, which, since his days, has hardly ever entirely slumbered. He was certainly the first who dared to boldly quit the beaten track, which had been used by the farmer for ages, and follow a way of his own. And although he has been well followed and imitated by succeeding cultivators, who have availed themselves of discoveries and machinery of which Tull had not the assistance, yet there have been none who have since excelled, or perhaps equalled him, in the boldness and originality of his conceptions, or in the energy with which he realized them.

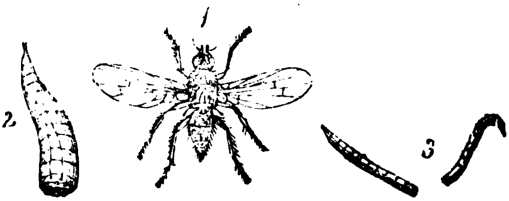
ON INSECTS MOST INJURIOUS TO VEGETABLES AND ANIMALS, AND THE MEANS BEST CALCULATED TO COUNTERACT THEIR RAVAGES.—NO. VIII.

By JAMES DUNCAN, M.W.S.

ONION-FLY—(*Anthomyia ceparum*).—There are a few kinds f dipterous insects, having a strong general resemblance to the common house-fly, which commit sad havoc among many of the esculent roots cultivated in gardens. Several of these have been often confounded, even by scientific observers, under the common name of *Musca radicum*, in consequence of their attacking the same parts of vegetables. But it may be regarded as a general rule, that insects feeding on plants which belong to different natural families, however much they may resemble each other in general aspect, are at least specifically different. The species which attacks the onion, for example, may be expected to frequent other alliaceous plants, and this is found to be really the case; but it may be presumed, *a priori*, that it is not the same insect commonly observed, in such similar circumstances, on the carrot, cabbage, &c. Attention to this circumstance would have prevented many of the errors into which gardeners and others have fallen respecting noxious insects, and, by inducing stricter examination, enabled them to discover differences which have too commonly been overlooked. The onion-fly, as far as we know, confines its attacks to the common onion (*Allium cepa*), the scallion, a variety of that plant, the leek (*Allium porrum*), and the shallot (*Allium escalonicum*). But so destructive is it in most seasons to these useful vegetables, that it is often impossible to raise a crop of any value; and even in the most favourable circumstances, it generally happens that a large proportion of the most vigorous plants are destroyed. We are informed that a market-gardener near Edinburgh suffered, last year, the loss of about L.100 from the ravages of this insect; and what we have ourselves witnessed of its devastations every season, and in different parts of the country, leads us to believe that the annual loss occasioned by its means is very great.

The fly which is the cause of this mischief belongs to a very extensive genus, named Anthomyia, owing to the disposition of the species to frequent plants. It is about three lines in length, and nearly half an inch in the expansion of the wings. The colour is pale ashy, the whole body covered with bristles, many of which are long and black, and spring from small black tubercles. These bristles are longest on the thorax, and are there arranged in four pretty regular lines; there is also a transverse row of them behind the eyes. Mouth and antennæ black, the latter short, provided with a dorsal bristle, which is naked, except at the base; forehead chesnut, the face somewhat silvery. Abdomen small and somewhat triangular, of the same colour as the rest of the body in the female, but with an interrupted black line down the middle in the male. Legs black, halteres and winglets pale yellow; wings clear, slightly tinged with buff at the base. (Woodcut, No. 1, fig. 1, female,[*])

No. 1.



All the perfect flies, no doubt, perish in the winter, and those which appear in spring have just issued from the puparium, which, during the cold season, is buried in the ground. While the plants are still very young, they sufficiently answer the purposes of the female. She places her eggs upon them, either on the leaves close to the earth, or introduces them within the coats of the bulb, which she is enabled to do by means of an anal tube with which she is furnished for the express purpose. These soon produce their larvæ,[†] which eat into the very core, and their presence is soon manifested by the sickly appearance of the plant. The leaves gradually become yellow and drooping; and when the bulb is examined, it is either found to be perforated in various directions, or completely excavated in the centre, the rootlets at the same time having become shrivelled and diseased, and incapable of extracting nutriment from the soil. The number of these maggots found in a single plant varies from one to nine or ten; we have occasionally found the latter number in a large onion. They usually differ also a good deal in size, as if the eggs had been deposited at intervals. The larvæ on one plant, however, are in all likelihood the produce of the same fly, as it is not usual for one insect to interfere with the food which has been appropriated by another for the support of its young.

---

[*] All the figures in this and the following cut are magnified, some of them very highly.

[†] In a communication with which he has favoured us regarding the ravages of the onion-fly in his gardens of St Mark's Place, near Edinburgh, Mr Syme states that the eggs are generally hatched in twenty-four hours.

When full grown, which is usually about a fortnight after their birth, these larvæ are about three and a half or four lines in length, nearly cylindrical from the tail (the thickest part*) to the middle, from which they gradually taper to a point at the other extremity. They are thick, fleshy, and shining, without hairs, and of a dull white colour. The hinder extremity is truncated, and surrounded with several small fleshy prominences; the head has two small tentacula, consisting of two black pieces furcate behind. The underside has several transverse folds or granular points to aid its motions, but it can move on its back and sides almost with equal ease. (Woodcut, No. 1, fig. 2.)

These maggots undergo the change to a pupa either within the cavity they have formed in the onion, or, which is most commonly the case, under the earth, into which they burrow for the purpose. The puparium is oval, about three lines long, of a chesnut colour, smooth and shining, formed by the indurated skin of the larva, to which a certain resemblance can still be traced, as the two oval hooks remain at one extremity, and the prominent points at the other. If this stage of its existence has been entered upon pretty early in the summer, the perfect fly emerges in about a fortnight; but if the season be far advanced, no further change takes place till the ensuing spring.

There is a succession of broods throughout the summer; but the statement of Bouché, that they continue till October, does not accord with our own observation. Indeed, it has been long remarked by gardeners, that the secondary crop of onions, sown in August or September, and called the Michaelmas or winter crop, generally escapes uninjured, which is no doubt owing to the season being too late for the propagation of the fly. It has been frequently observed, that plants in a state of disease, such especially as are gouted or moulded, as gardeners sometimes term them, are most liable to be attacked; and we have no doubt that this is to be ascribed to the same cause which leads carnivorous flies (as mentioned in a preceding paper) to select a diseased sheep in preference to a healthy one. The substances on which they feed are most congenial to these creatures when in a state of putridity; and any approach to that condition is immediately detected by the parent fly, whose sense of smell is singularly acute, and is the cause of her preference, as being thus best adapted to the taste of her offspring.

---

* We may take this opportunity of correcting an error, accidentally overlooked in revising the proofs, occurring in No 44. of this Journal, where it is mentioned, in a general view of dipterous larvæ, that the *tail* is the narrowest part. The reverse of this should have been stated as the general rule.

The fact previously stated, that a large proportion of the onion crop annually falls a sacrifice to this fly, is a sufficient indication that no specific against its depredations has been discovered, or, at least, is generally known. A remedy has been often sought for, by employing some particular kind of manure, and at times with apparent success. Thus, an individual who has had great experience in gardening assures us, that the application either of horse or swine dung prevents the appearance of the fly. It seems to be the invariable practice, at least in the neighbourhood of Edinburgh, to use cow-dung for raising onions. But the difficulty of understanding how the nature of the manure can have any preventive influence, arises from the consideration, that the eggs are laid upon the plant, often a considerable way up the stalk, and never in the ground. It is not very likely that the fly will institute a rigid scrutiny as to the means by which the plant has been reared; it is enough for its purposes that it happens to exist. Neither is it probable that any kind of manure can so far alter the juices or secretions of the plant, as to render it distasteful to the insect. But it may at the same time be true, that certain substances diffused through the soil emit a peculiar odour, so offensive to the insect as to deter it from approaching; and this seems to be the only way in which any kind of manure can act as a preservative, in cases like the present. It is thus that the plan suggested by Macdonald of transplanting seedling onions, first dipping the roots in a mixture of three parts of earth and one of soot, moistened with water, is likely to be beneficial; or it may prove equally so merely to strew the onion-bed with soot, care being taken to do so before the fly has deposited her eggs. Perhaps a still preferable plan is that recommended by Major, of watering the beds with a mixture composed of one gallon of soap-suds to four quarts of gas-water; or, in place of the latter, two quarts of gas-tar; or, in fact, any liquid of sufficiently offensive smell to keep off the fly, and, at the same time, not prove hurtful to the plants. When such applications as these entirely fail, it may in general be presumed that it is chiefly owing to their not having been made at a sufficiently early period; for they must be regarded solely as preventive; the eggs being once laid, no means are likely to be available for destroying either them or the larvæ, which would not prove equally fatal to the plants.

It is obvious that all the infested onions should be removed as soon as possible; for, if the larvæ were allowed to attain maturity, each plant would produce a detachment of new assailants. The safest plan is to burn them, or to throw them for a short time into hot water. As the pupæ pass the winter in the ground, near the place of their birth, and at no great depth, it may be of advantage to stir the surface occasionally, in order to expose them to birds, which devour them eagerly. In severe seasons, also, some of them may thus be destroyed by frost, although, generally speaking, insects in that condition are very little liable to be injured from that cause.

Cabbage Fly (Anthomyia Brassicæ).—Another fly, very similar to the former, both in appearance and habits, is described as very destructive to the cabbage tribe in many parts of the Continent; but as little injury seems to be caused by it here, a very brief notice of it will suffice. It is of an ashy colour, the thorax with three indistinct black lines on the back; the abdomen nearly linear, with black stripes on the back in the male, but entirely ash-grey in the other sex. Length about three lines. The maggot is very like that of the onion-fly, but thicker, and having a greater number of fleshy protuberances at the hinder extremity. It eats into the stems and roots of plants of the cabbage tribe, causing them to rot and decay. Entire fields are often destroyed on the Continent by this pest. The same remedial treatment used in regard to the onion-fly will be equally applicable in this case.

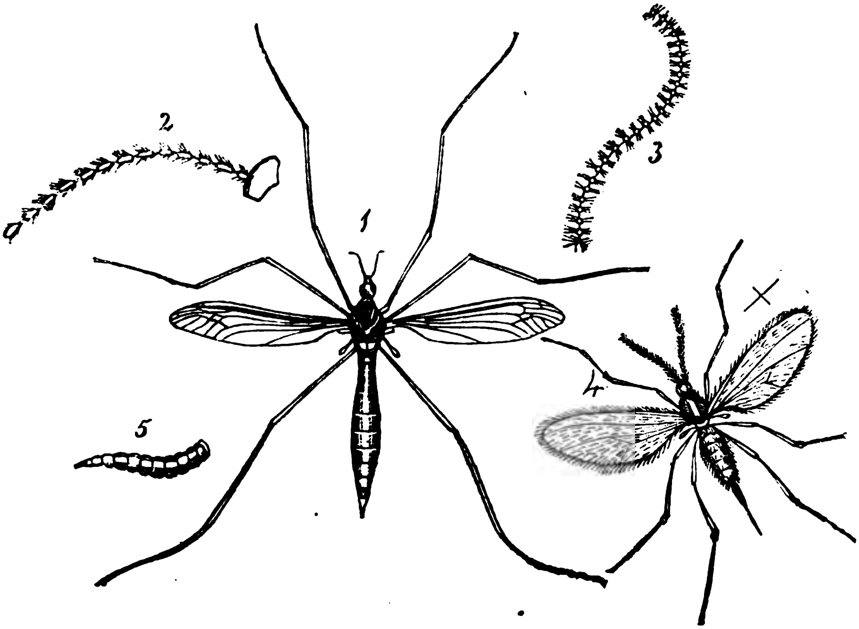
Carrot Fly (Psila Rosæ).—In many parts of the country, and particularly in the south of Scotland, the carrot is very much damaged by a small larva, which is said to be produced by the fly above named, although we have not succeeded in rearing the fly from it. The larva is about two and a half lines long; slender and cylindrical, the segments rather indistinctly marked, the colour pale yellow ; the small black piece within the two first segments furcate behind, distinctly visible. —(Woodcut, No. 1, fig. 3.) The fly is nearly two lines long; head reddish-yellow; palpi and antennæ tipped with black; body somewhat hairy, black, and shining, with a slight gloss of metallic green; legs light yellow; halteres white; wings clear and colourless. The female is provided with an articulated tube, by which she lays her eggs in the young carrots. The larvæ eat passages throughout the whole root, the places which they perforate becoming of a rust colour, and entirely losing their sweet taste. The plants fall off by degrees, and, if the larvæ are numerous, soon die altogether. The larva leaves the carrot when full-grown, and is transformed, among the soil in the neighbourhood, into a small, light brown, obliquely marked oval pupa.

Remedies similar to those recommended for the onion-fly may also be used in this case. As the larva is always beneath the surface of the ground, it is more likely to be affected by any substance mixed with the soil than that just alluded to. We have often seen soot employed, and it was generally thought with advantage. But we have often witnessed the complete destruction of the crop, notwithstanding the adoption of every preservative means that was thought likely to be effectual.

CRANE FLIES *(Tipulæ)*, constitute a well known tribe of Diptera, distinguished by various provincial names, suggested by the unusual length of their legs, and narrow, elongated body, such as *long-legs*, *tailors*, *crane-flies*, &c. They frequent meadows and pasture lands, the larvæ living beneath the ground, and frequently causing much mischief, by loosening and destroying the roots of the herbage. Numerous different species (at least forty) are found in this country, and several of these are very common. To give a full description of them all would greatly exceed the limits to which these notices must be confined; neither is it necessary for the object we have in view, because they are so much alike in their habits, that, in regard to these, it may be said, " ex uno disce omnes." We shall, therefore, select for description one of the most common, and which has been long noted as a grievous enemy to the farmer,—premising, that it may be determined whether an insect belongs to the genus now under consideration, by observing if it presents the following characters: antennæ 13-jointed, the radical joint cylindrical, second cup-shaped, the rest cylindrical, and bearing a few verticillate hairs at the base of each; palpi projecting, incurved, cylindrical, 4-jointed, the terminal joint elongated; ocelli wanting; wings lanceolate, spreading.

Meadow Crane-fly (T. oleracea), De Geer, vi. 134, fig. 18; *Tip. terrestris*, Harris's Expos. pl. xiv. fig. 2.—Nearly an inch in length, of a brownish-grey colour: palpi and antennæ dark brown, the lower joints of the latter yellowish-grey; forehead grey, with a reddish-brown line, the snout yellowish-brown; thorax with a reddish-brown line on the back, bounded on both sides with dusky; the sides and hinder parts whitish-grey; abdomen obscure reddish-brown, inclining to a darker hue on the back; legs yellowish-brown, becoming dusky brown downwards; wings pale brown; the nervures and anterior border yellowish-brown, the latter succeeded by a very indistinct whitish streak. In the female, the abdomen is thickest near the middle, from which it tapers to a point at the hinder extremity; that of the male is thickest at the hinder extremity, which forms a kind of club.—(Woodcut No. 2. fig. 1, female.)

No. 2.



This insect is very plentiful during the summer months in all parts of the country. Its long legs are of immense advantage to it in the places it frequents, as they enable it to skip over the grass as if on stilts; and it still further facilitates its motions while so doing, by keeping the wings expanded, to render it buoyant. The female lays a great number of eggs, which are very small in proportion to the size of the insect, and of a black colour. These she places at some depth in the earth, which she pierces for the purpose with her ovipositor. The insects may easily be seen performing this operation, and it will at once be known that they are so employed by the singular position they assume. The body is placed in a perpendicular direction, supported on the hinder feet and extremity of the abdomen, while the wings are expanded, and the anterior legs rest on the surrounding plants. When a sufficient number of eggs have been laid in one spot, the insect moves on to another, without changing the vertical posture of her body, merely dragging herself forwards by her fore-legs, aiding her movements with her wings. These Tipulæ seldom fly far at a time, and it is only when the weather is somewhat calm that they venture to do so at all. Their legs are exceedingly fragile, and, when seized by them, the insect generally makes off, leaving them in the hands of the captor with an appearance of the utmost *sang-froid.*

When full grown, the larvæ are in the shape of an elongated cylinder, somewhat suddenly attenuated at both extremities. They are of a dull greyish colour, and without feet. The head is furnished with two hooks, one on each side. "Although these hooks," says Reaumur, "touch at their points, they do not seem designed to act in opposition to each other; they appear rather to act against two pieces placed on the same line below them. These pieces are fixed and scaly, convex on their exterior surface, and convex interiorly; their upper edge dentated; and it would seem that each hook or claw (*crochet*) is designed to press the substances to be cut or bruised upon the series of teeth." On the upper part of the head there are two short fleshy horns. The hinder extremity is furnished with six rays of unequal size, which fold over and protect the stigmata or breathing pores. The pupa is not unlike the chrysalis of some kinds of moth; it is nearly of the same colour as the larva, the edges of the segments fringed with pretty strong hairs.

The ravages of these larvæ have been often described by authors, and are experienced more or less extensively by farmers almost every year, in all parts of the country. They prefer a soil which has been long undisturbed by the plough; and if it contain some portion of peat-earth, it seems thereby better adapted to their tastes. "In the rich district of Sunk Island, in Holderness, in the spring of 1813, hundreds of acres of pastures have been entirely destroyed by them, being rendered as completely brown as if they had suffered a three-months' drought, and destitute of all vegetation except a few thistles. A square foot of the dead turf being dug up, 210 grubs were counted on it; and, what furnishes a striking proof of the prolific powers of these insects, last year it was difficult to find a single one."* Meadow grasses are not the only food of these depredators; they likewise attack different kinds of corn, especially oats.* They reside generally about one or two inches beneath the surface, mining their way among the roots of the herbage, and causing it to wither for want of nourishment.

---

* Kirby and Spence's Introd. to Ent. i. 318.

After mentioning their extensive devastations, it may occasion surprise to be told that many eminent observers are of opinion, that these maggots eat nothing but the fine mould they find at the roots of plants, and that the injury caused to the latter arises solely from their disturbing the soil, and preventing the rootlets fixing themselves. Such was the opinion of Reaumur; and the generality of subsequent writers on the subject have yielded to his authority. He seems to have come to this conclusion chiefly from examining the contents of the alimentary canal, which might readily lead to mistake, as these must have been materially changed by digestion. The mouth seems extremely well adapted to cut and triturate the fibres of plants; and, on examining ground mined by these larvæ, we have observed what we considered obvious proof of the rootlets having been gnawed. Mr Stickney, who has published *Observations on the Grub*, made some experiments for the express purpose of determining this point, and they convinced him that the larvæ devour the roots of grasses. Indeed, unless this were the case, it would be impossible to account for the herbage withering to such an extent in places where the maggots prevail; for this could never arise from such small creatures, even though very numerous, burrowing in and loosening the soil. When earth-worms are plentiful, they must produce a considerable disturbance in the soil by their winding galleries; but these, so far from retarding, have always been regarded as promoting the growth of plants.

---

* Dr Fergusson, of Alford, alludes to the injury done to the oat crop in Aberdeenshire by an insect which he calls the grub of *T. oleracea*, in a short article in the Highland Society's Transactions (No. 49, p. 343.) We know not whether the connection between the larva and perfect insect was in this instance fully traced; one or two circumstances incidentally mentioned may excuse some doubt on this head. It is natural to suppose, and the supposition is the cause of frequent error, that when certain insects appear plentifully in localities where noxious larvæ abound, the one is the produce of the other, without taking proper means to establish their identity. Larvæ may be plentiful where not one of the perfect insects can be noticed, and *vice versa*.

"The grub of this tipula," says Mr Stickney, "commits its ravages chiefly in the first crop, after the breaking up of the grass-land, also after clover and beans; the fly from which the insect is produced having deposited its eggs in the soil amongst the grass, clover, or beans. * * * On investigating the habits of the insect, I found that it took the fly state about the beginning of the month of August; I therefore concluded, as we get our clover hay from the land a little after midsummer, that, if we ploughed the clover stubble any time after that, and before the month of August, it would be nearly free from the grub, as instinct has directed the fly not to leave its eggs upon the naked soil where no vegetable is growing. I know of no application to the land that will in any way destroy the grub; but we are much indebted to the rook, and a variety of other birds, for keeping its depredations within limited grounds."*

The saturation of the soil with some caustic fluid seems the only way by which this maggot can be destroyed. The perfect insects are easily caught; but they are so generally distributed, and usually so plentiful, that their destruction in this way would be a hopeless task.

Wheat Fly (Cecidomyia Tritici), *Tipula Tritici*, Kirby, Linn. Trans. iv. 230, v. 106, pl. I. fig. 1–3.—This small insect is another member of the family of the Tipulidæ, which has attracted much attention of late years by the damage it has caused to wheat crops. It is very minute, scarcely exceeding the twelfth part of an inch in length, and resembling a small gnat or midge. The genus, which contains twenty-five other British species besides the above, is distinguished by the following characters: antennæ inserted in the front of the face, as long as the body or longer, more or less necklace-shaped, pilose, consisting of 13 subovate joints in the female (Woodcut, No. 2, fig. 2), and 25 globose remote joints in the male (fig. 3), palpi 4-jointed, ocelli wanting, wings ciliated and pubescent, each with two nervuses extending to the margin, the anal one angulated, and producing a transverse nervure which unites with the third. The species whose history we are now to consider is about a line in length, exclusively of the ovipositor; the colour of the whole body reddish-yellow, deepest on the thorax; antennæ dusky, eyes black, legs pale reddish-yellow, wings longer than the body, rounded at the tip, of a whitish hue, with iridescent reflections. (Woodcut No. 2, fig. 4.)

---

* On the Utility of Science to Agricultural Pursuits, *Brit. Farmer's Mag.* vol. vi. 321.

The attention of naturalists and agriculturists was first directed to this fly in 1795, by Marsham, treasurer to the Linnæan Society, and author of the *Entomologia Britannica*. At his request the inquiry was taken up by Mr Marwicke and the Rev. Mr Kirby, by the latter of whom it was prosecuted with such diligence and success, that comparatively little was left for future observers to determine. The investigations of these scientific men were aided and supplemented, as they always should be in such cases, by practical agriculturists, among whom Messrs Sherriff and Gorrie deserve honourable mention; so that our acquaintance with the natural history of the wheat-fly may be considered pretty complete.

The fly makes its appearance in wheat fields just about the time when the ear is beginning to emerge from its leafy envelope, most commonly in the early part of June. Owing to its extreme minuteness, it is very apt to escape observation; but where it exists it is most likely to be noticed on a calm evening, flying about in little undulating clouds, after the manner of winter gnats (*Trichocera hiemalis*) and other kindred species. Mr Kirby seldom saw them much before seven o'clock; at eight, he says, the fields begin to swarm with them, at which hour they were all busily engaged in laying their eggs, and about nine they generally disappeared. Mr Sherriff has observed them also flying about on cloudy mornings, and even depositing their eggs about two o'clock in the afternoon. After the sexual union it is probable that the male soon dies, as nearly all those observed on such occasions are females. An ear just emerging from the sheath is generally preferred as a receptacle for the eggs. They are introduced by means of the ovipositor into the floret, being usually placed upon the interior valvule of the corolla, just above the stigmata. The operation of laying has been closely observed and minutely described by Kirby. The fly is so engrossed by her occupation that she is not easily disturbed, and even a magnifying glass may be held close to her without interrupting her proceedings. A considerable number, sometimes to the amount of thirty-five, may be seen at the same time upon one ear; they place themselves in such a position that their anus stands nearly at right angles with the margin of the glume of that floret which they mean to pierce. The ovipositor, which is a retractile tube, as fine as a hair, is slowly introduced, and the eggs deposited. The instrument is then withdrawn with great caution and deliberation, yet it sometimes happens that the fly is unable to effect this, in which case she is detained a prisoner until some enemy devour her.

"I was very desirous," continues Mr Kirby, "of seeing the eggs pass through the vagina, but my first attempts were unsuccessful; at length I was gratified by this pleasing spectacle. I gathered an ear, upon which some of our tipulæ were busy, and held it so as to let a sunbeam fall upon one of them, examining its operation under the three glasses of a pocket microscope; I could then very distinctly perceive the eggs passing one after another, like minute air-bubbles, through the vagina, the aculeus being wholly inserted into the floret. I examined the process for full ten minutes before the patient little animal disengaged itself; and at last, it was through my violence that she discontinued her employment and flew away."*

By this mode of oviposition the eggs are placed in small clusters, varying in number from two to upwards of twenty. In passing through the oviduct they receive a coating of glutinous matter, which causes them to adhere firmly to the glumes. They are of an oblong shape, transparent, and of a pale buff colour. They are hatched in ten or fourteen days, and the minute maggots which proceed from them have the same general form as the dipterous larvæ already described. (Woodcut, No. 2, fig. 5.) They are at first clear, transparent, and colourless; but no sooner do they begin to feed on the pollen than they acquire a yellow or saffron hue. They appear to devour the pollen both before it is discharged from the anthers, and after it has fallen upon the germen for the purpose of fertilizing it. It is probable that in so doing they likewise consume the spermatic moisture diffused over the stigma, without which the pollen cannot perform its fructifying office. Minute as these creatures are, when we consider what numbers of them frequently infest a floret, no fewer than forty-seven having been counted in one, it is easy to perceive how seriously they must interfere with the process of impregnation. It is not improbable, also, that, as they increase in size, they likewise attack the milky pulp destined for the nutriment and development of the grain. At all events the result of their operations is, that the grain shrivels and decays as if deprived of nourishment, and the expectations of the husbandman are grievously disappointed.

---

* Linn. Trans. v. 99.

The maggots are, in general, nearly all full grown by the beginning of August, when they leave the ear and find their way to the ground, into which they burrow to the depth of an inch or half an inch. Soon after this they are converted into small oval pupæ of a dark brown colour. In this condition, and with no other shelter than what is afforded by a thin covering of soil, they pass the winter apparently uninjured by the severest frosts. Many are also lodged, there can be no doubt, about the roots of the stubble, and it is probable that not a few continue within the hollow of the straw.

There can be little doubt but that the wheat crops, in some part or other of the country, suffer every year more or less from the attacks of this insect. It was very plentiful in many parts of England in 1798. Yellow maggots are noticed as having abounded in the wheat crop in various parts of Northumberland, Berwickshire, Perthshire, &c. in the year 1808; and we find various incidental notices of their ravages up to 1827, when they became extremely injurious, and attracted general attention. In 1830, also, they greatly exceeded their usual numbers. According to Mr Gorrie, the loss sustained by the farmer in some parts of Perthshire, in 1829, varied from 8 to 20 bushels per acre.

So far as hitherto ascertained, the only other plant besides the wheat on which the maggots of this fly subsist, is the common couch-grass, *Triticum repens*. Different opinions prevail as to whether the fly attacks all varieties of wheat indiscriminately. It certainly appears extremely improbable, that an insect which inhabits two distinct *species* of plant, differing from each other so materially as *T. hybernum* and *T. repens*, should be found to reject any *variety* of that kind which forms its most appropriate food. Still it may possibly happen, where there is room for choice, that one variety is preferred to another. This much at least is certain, that of several fields of different kinds of wheat growing in the vicinity of each other, one has frequently been infested, and the rest escaped almost uninjured; yet even this fact is far from being conclusive, for the preference may have been owing to the accidental circumstance of one of the crops being nearer than the rest to that period of its growth at which it is best adapted to the purposes of the insects; and the latter being somewhat of a gregarious nature, are apt to assemble in greatest numbers in the neighbourhood of the spot where they were first led to make a settlement. We believe that the bearded and woolly-eared varieties at present enjoy the reputation of being most exempt from the attacks of this formidable foe; but, before the farmer could be desired to allow himself to be influenced in his choice of seed by this presumed immunity, it were to be wished that it had been inferred from a more extensive, as well as a more accurate, series of observations than has yet been made on the subject. A similar remark may be also applied to another statement occasionally made, that winter-wheat is much less likely to suffer from this evil than spring-wheat.

It is often a matter of regret, when considering the injuries inflicted by insects on our most valuable crops, even on those which afford what has been called the staff of life—"bread which strengtheneth man's heart;" that the remedies hitherto applied are in general so inadequate and unsatisfactory. We cannot indeed expect them to become thoroughly efficient, until accurate scientific information is combined with practical experience, and when both united are carefully and systematically directed to an inquiry where the results promise so abundantly to compensate for the labour bestowed.

"The agriculturist perhaps will ask, upon the present occasion, Can you inform us how we may prevent or diminish the ravages of these insects? In reply to this I would observe, that the first step towards curing a disorder, is to find out its cause. In the present instance this is the business of the naturalist, and this *is* done. The intelligent farmer has no longer to ask what occasions the mischief; all he has now to do, is to aim at discovering a remedy. By a set of experiments first made upon a small scale, he may possibly find out some method that will prevent this insect laying its eggs in his wheat; these should commence as soon as the ear begins to quit the *folium vaginans* or hose, and they ought to be continued till the germen is impregnated, or, to use the rural phrase, the wheat is off the blossom. Perhaps fumigations of tobacco or sulphur, if made when the wind is favourable, might render the ear disagreeable to this insect. Much of the injury which this fly does, in years peculiarly favourable to its increase, it is possible, by some such means might be prevented; yet it is not certain that the total annihilation of it would be ultimately beneficial. But be it granted that our labours lead the way to no discovery of this kind, may it be said that we have been idly busy or unprofitably laborious, when we have succeeded in developing some of the most curious mysteries of nature, and in laying open the history of some of those secondary causes, which, guided by the hand of Providence, produce scarcity or plenty as the one or the other preponderate."*

We are apprehensive that the fumigations here alluded to could not be made, without very great trouble, on a sufficiently extensive scale to be of much benefit. It is possible that Mr Gorrie's plan of ploughing the wheat-stubbles, and having what is called a skim-coulter attached, of such a construction as would cut and lay about an inch of the surface at the bottom of the furrow, would bury many of the pupæ at such a depth as to render their resurrection improbable. But grass and clover seeds are so often sown with wheat, that this method can seldom be practised, even if there was more inducement to follow it than there really is, without deviating from the ordinary rotation. The same objection will apply to Mr Poppy's suggestion of burning the wheat-stubble on the land; but when this can be done, it promises to be a highly useful expedient. When the stubble is short and scanty, the conflagration may be assisted by straw, or other inflammable matters (such as dry-furze), brought for the purpose. If it is rank, as is usually the case in Suffolk and some other southern counties where the reapers scarcely bend their backs in cutting the crop, the fire will be sufficient to heat the whole surface of the ground, and in all probability destroy the greater part if not the whole of the pupæ, heat being speedily fatal to them. Mr Sherriff conjectures that, as early sown wheat may be expected to blossom before the eggs of the fly are ready to be deposited, and late sown after the proper time for that operation, we might manage, by properly timing the crops, to destroy the fly by starvation.† But the designs of Nature are not to be thus easily frustrated. There is a plastic and accommodating principle in the nature of insects, conferred upon them by that Benevolence which careth for all its creatures, apparently for the express purpose of enabling them to maintain their existence among the numerous hostile influences to which they are continually exposed. In such a case as that here supposed—the female being ready to deposit her eggs before the appropriate plant is ready to receive them—it usually happens that *the life of the insect is purposely prolonged* until a suitable opportunity occur for continuing the species. A whole season is in this way sometimes added to the ordinary duration of insect life; and it is unlikely, unless in rare cases, that the brood is ever lost in consequence of a want of synchronism in the maturity of the insect, and the plant which is to form the nursery for its young.

---

* Kirby, Linn. Trans. v. 105.

† British Farmer's Mag. iv. 4.

Nature herself has provided a considerable check on the multiplication of these flies, by making them the prey of no fewer than three different kinds of ichneumons. One of these (*Encyrtus inserens*) is about half the length of the wheat fly, black and shining, and is conjectured to insert its eggs into those of the tipula. Another (*Platygaster tipulæ*) is black, with the legs and base of the antennæ red: it commits its eggs to the larva of the tipula, placing one in each. A third (*Eurytoma penetrans*) is black, with a brassy lustre, the abdomen glossed with blue, compressed, and truncated behind. Some of these ichneumons appear in great numbers where the fly abounds, and multitudes must become their victims.

There are several other minute tipulidæ more or less injurious to corn in different parts of the world, but the above appears to be the only obnoxious one inhabiting this country. The famous Hessian fly of America (so called because erroneously supposed to have been introduced in straw by the Hessian troops during the American war) is likewise a *Cecidomyia*, and very closely resembling *C. tritici*. We are fortunately not called upon to enter into its history, as its supposed appearance in this country, in the beginning of the present century, was owing to its having been confounded with another and very distinct fly, to be noticed hereafter.

ON CANKER IN LARCH, PEACH, AND APPLE TREES.

By Mr JOHN PEARSON, Gardener and Planter to W. L. Childe, Esq. of Kinlet, near Bewdley.

Mr Drummond's very interesting remarks on the canker in the larch,* strengthens a position which I have taken on this most important subject, not only in the larch, but in peach and apple trees. The larch being planted here as nurses, as they are generally termed, they are of course felled as soon as they come in contact with other trees, which are considered here of greater importance. As the planting done here by the present proprietor has been with a view of improving the landscape, and as the larch is not approved of for that purpose, there are few trees of that species left to grow to the size of timber. However, some groups of larches which were left in 1835 in a plantation that hangs to the north-east, were found to be affected with the canker when they were felled in 1837. The disease did not differ from that described by Mr Drummond and others.

Four years ago I had one of the best walls of peach and nectarine trees in the kingdom, which, for several years before that, was admired by every gardener and gentleman who saw it in the months of August or September, when scarcely a brick could be seen for healthy foliage and fruit; but the canker or gum committed sad destruction amongst the trees during the cold and moist summers of 1837 and 1838; so much so, that I thought it prudent to replant the upper part of the wall, the trees on which were nearly dead, and which were the most exposed to the north-east. The contrast between the roots and the tops of the trees as to healthiness was particularly remarkable, as the tops were nearly dead, and the roots were as healthy as any liquorice roots which were grown at Pontefract. I found the old border four feet deep, of excellent strong soil; but, as I deem it imprudent to make too good a border in a cold climate, I made the new border only two feet deep, with a rubble drain bottom. I planted it in March 1839 with healthy trees from Messrs Lee and Co. of Hammer-smith, and they made a tolerable start; but, notwithstanding the prevention of plethora, the gum or canker was not prevented, for some of them suffered severely by it, the summer and autumn being cold and wet. This year they have done better, and a probable reason for it is, that we have had more light, more heat, and less wet. The first appearance of the disease in the peach is so very slight, that any person unacquainted with it would fancy that it was of no consequence, as the small brown circular spots which appear on the bark of the current year's shoots may be cut out with a sharp knife, and vegetation will go on as though no disease had ever existed; but let attention be diverted from them for a few days, and we will find that the spots have spread so rapidly as to surround the whole shoot, and that the circulation is stopped, and the branch dead. Various are the theories, and various also are the nostrums, which have been recommended for the cure of this destructive disease, and though the plausible theory and practice of George W. Johnson, Esq. (see No. xl. p. 470 of this Journal), would appear conclusive on the subject of canker, yet, from various circumstances, I am obliged to differ from that learned author.

---

* No. L., p. 221, of this Journal.

That soil possesses considerable influence over its products no sensible man will doubt, but that it is the main cause of canker in the peach I presume the following particulars will shew the contrary. Last spring my employer requested me to convert an old pine-pit into a peach-house, and I planted an old Galande peach and an old Murrey nectarine in it, both which were intolerably affected with the canker or gum. I planted them merely to furnish the trellises with a few fruit until the young trees should establish themselves: in fact, I considered them as castaways, but now, the middle of October, the two old trees are furnished with most beautiful bearing wood without spot or blemish. I tried the above experiment merely to prove what I had frequently stated to my employer, that if he would cover the whole of his peach-wall with glass, the canker would disappear for ever. In this presumption I was not mistaken, as appears from the above experiment. I am aware that it might be urged against the conclusion drawn, that it was owing to the old trees having been moved which caused them to grow less luxuriantly, and produce that kind of short-jointed bearing wood which is not so liable to be attacked by the disease; but I have a *patient* out of doors which will answer for itself, and which is worth a thousand theories. I replanted an Elruge nectarine of considerable size out of doors at the same time I planted those in the peach-house; and during the very favourable spring of the present year, I was very much gratified to see both my young and old trees, as well as my patient, make a beautiful start, they, like teetotallers, seem to have forgot their old habits; but the sudden change, in the early part of June, from warm weather to comparatively cold, gave a check to vegetation, and my young and old trees, as well as my patient, shewed patches of the disease. Thus does it appear, in this locality at least, that a peach tree being ensconced under glass prevents the canker. As to a moist border having any thing to do in causing the disease is quite out of the question here, as I dare venture to assert that the border had not been wet through from the time I planted the tree to the appearance of the disease.

I am of opinion that a degree of cold is the only cause of the disease; but that its severity aggravates the disease considerably; and this leads me to quote from Mr Johnson's theory where he states, that "this disease *commences* with an enlargement of the vessels of the bark of a branch, or of the stem." I assert, however, that the enlargement of the bark is not the commencement of the disease, but is only an assurance that the disease has established itself some time previous to the enlargement, and that it is not the returning sap-vessels which are first diseased, but the concentric glands or pores which are found in the bark (I mean those glands or pores which were supposed by T. A. Knight, Esq. to give character to wood) that are first affected by sudden changes of the weather; and that from the septic qualities of disorganized vegetable matter decomposition or mortification commences, which thus deranging the functions of returning sap-vessels causes the enlargement. Therefore I cannot agree with Mr Johnson when he makes a resemblance betwixt the canker in trees, and any disease in the animal system arising from indigestion, &c.; but would rather compare it with those external diseases arising from too low a temperature, such as murrain in cattle, and frost-bitten noses in men, in both of which cases the circulation being stopped, speedy remedies must be resorted to, or mortification will destroy the very existence of the patients.

I have here two Bedfordshire roundling apple-trees planted within thirty yards of each other, both growing in a substratum of sandy rotch, one of which is seriously affected with the canker, so much so that I thought nothing would do but decapitation, while the other tree is scarcely affected by it. Now, how is it that the one tree should be nearly dead with canker, while the other is in comparatively good health? The facts are, that I trim my trees punch-bowl shaped, and when those two trees were young they bore a good crop of fruit, which brought the branches of the cankered tree almost horizontal, and thus they have remained ever since, and it is these horizontal branches which are nearly dead with canker; from which I draw the following conclusions, that, as the scarcely affected tree is in a sheltered situation with its branches in an almost erect position, the north-east wind had not cooled the bark below a given point, while the seriously affected tree being in an exposed situation with its branches horizontal, it has had its system cooled down below a given point, and by that means the natural functions of the tree have been checked.

Pruning no doubt has a tendency to prevent this disease in the apple arising from too low a temperature, as a branch that is surrounded with thick set short spines, acts as a shield to the more tender stem or branch. As to Mr Johnson curing his russet apple-tree of canker by pruning it, it is quite as probable that milder seasons were the real doctor. Wherever an apple-tree is planted, and whenever the whole of its summer shoots are not ripened, it is owing to its being either too tender a kind for the situation, or the soil too good for the climate, or the climate a very bad one; and when all these evils combine it is not surprising should the tree die of canker.

In 1828, when I first came to Kinlet, I found an apple-tree of the first-rate quality for the table, but did not know its name; and as I paid an occasional visit to Downton Castle, I took an apple of this mysterious kind to shew to Mr Knight, who, as soon as he saw it, pronounced it to be the Golden Harry, a most excellent apple in some situations; and he added "that it is a Herefordshire apple, and one which I recommended to Sir Joseph Banks many years ago. Some time after that, on a visit to Sir Joseph, as I was going round the garden with him, he said, Oh! here is the Golden Harry apple you sent me. The tree has run wild, and the fruit it bears is all cracked to pieces, and is not worth a farthing. I am going to have it sent to the rubbish heap. So much for a good climate on this apple," concluded Mr Knight. "Kinlet, being an exposed situation, just suits it."

Formerly it appeared singular to me when I read the practice of various authors on the cure of canker in fruit trees, that they always blamed the *subsoil;* yet the subsoil of every situation varies as much as the superincumbent soil. One blames cold clayey rotch, while another blames sandy rotch; a third does the same with clay, while a fourth blames the sand; and the prevention of the roots penetrating these various subsoils seems to be the panacea for all the cankering evils of these various situations, but is it not singular enough that the cankering matter should be found in every subsoil in the kingdom, or wherever a gardener chooses to stick in his spade? The mystery is solved at once when we come to consider the withering and penetrating power of the weather on spongy unripened wood. Canker proceeds also from cuts, bruises, and the attacks of insects; but all these produce insignificant effects compared with those of the atmosphere. It may appear difficult to reconcile the above theory with the canker in the larch. I say nay, for as there are times when the atmosphere hangs between deposition and evaporation, that is, a lurking atmosphere which is neither cold enough to freeze, nor warm enough to send off its superabundant moisture, it may be that this is the time in which the glands of the tender bark of unthinned or improperly thinned larches become affected. Hence those beautiful specimens of larch at Dunkeld, and other places, which having been planted thin, the bark became thoroughly indurated, and able to withstand the effects of that lurking atmosphere which I have attempted to describe. Hence also to avoid the canker in the larch, timely thinning may be advisable, so that every tree may support its own character.

ON THE FOUR-COURSE SYSTEM OF HUSBANDRY, WITH HINTS ON ITS ADVANTAGES AND DEFECTS.

By Mr Matthew Marmaduke Milburn, Thorpfield, Thirsk.

Some few years ago the four-course system was considered the perfection of the art of cultivation on light soils. The perfect alternation of green and white crops, and the combination of return to the cultivator in the shape of grain and stock which it embraced, induced the belief that it was the ultimatum of improvement, and every description of soil which could be made to bend to it, was rapidly cultivated on its principles. Two recommendations it possessed which were certain to render it a favourite amongst the farmers; it prevented the necessity for a naked fallow, and was, perhaps, as far as can be expected, nearly a self-supplying system. It required the addition of manure but once in four years, and then required a quantity of extraneous manure but little compared with the usual modes of management at the time it was introduced. Prior to the existence of *system* in farm-management, husbandry consisted of ploughing up the sward and cropping so long as the soil would produce any grain crop, and then allowing it to lay itself with weeds, and " rest" until it was again broken up for the same purpose; and this was a rotation,—primitive and simple it is true, but still a complete rotation. The decomposed vegetable matter accumulated during the existence of the sward,—formed the nourishment for the grain crops which followed,—and when they had exhausted it, a growth of indigenous plants succeeded, which would exist with a less portion of nutriment than any exotic could; these grow and decay for a time, and again furnish a supply of matter fit for the food of a succession of exotics. The next step in improvement is the interposition of fallow, which allows the soil to derive all the benefit from the action of the sun and air, as well as of thoroughly clearing it of weeds; and, added to this, the return of a portion of the crop in the shape of decomposed vegetable (manure) to supply the place of that abstracted from the soil by cropping. The next step is the intervention of green crops consumed by stock, and this comprises the "Norfolk" or four-course system. This, closely pursued, is the following:—

1. *Turnips* (manured), consumed upon the land.
2. *Barley*, sown with clover-seeds.
3. *Clover* and other artificial grasses, mown or depastured.
4. *Wheat*, sown upon the clover lea, which closes the course.

To shew the adaptation of these crops, they shall pass rapidly in review, *seriatim*.

1. *Turnips*.—For these, it is necessary to have the land thoroughly cleaned. The time of sowing, about the commencement of summer, gives the farmer, in ordinary seasons, an opportunity of thoroughly cleaning the land, and the subsequent hoeings and weedings completely accomplish the purpose. To obtain this crop, a great deal of manure is necessary; but when supplied, its effects are felt, directly or indirectly, for the three subsequent years. It is essential to the full development of the system that these turnips should be consumed upon the land; for this great quantity of vegetation produced would, if taken from the soil, rob it of more nutriment than the manure would supply (I am speaking of light soils). The mode of consuming the turnips should be noticed; it is such as to supply the principles necessary to vegetation in the most complete manner. First, a considerable portion of the leaves, roots, and skins of the turnips are wasted, and decompose; then the constant droppings from the fleeces, with the excrement of the sheep, which is greater or less in proportion to the heaviness of the crop; and hence the necessity of endeavouring to obtain a full crop of turnips. Another advantage is the compression of the loose earth, and perhaps more than all, there is the carbonic acid gas which the animals evolve while consuming the plants, and which is absorbed by the soil.

A firm, rich, seed-bed is thus furnished to a grain crop, and generally barley is selected, not because it is best adapted to follow turnips, for wheat seems to be more successful, but because the turnips are consumed in time for a spring crop, and as barley is generally more valuable than any other, it is generally sown. The fact is, the soil is too much compressed, and too adhesive for the growth of barley: it would generally succeed better as the last crop of the rotation, but commonly it is impracticable. Clover-seeds do not come to perfection in the year in which they are sown. They require a whole summer and a whole winter before they are at all useful either for the scythe or the stock. Hence, if sown alone, it would require two years' use of the land for one crop. By sowing them with the barley this is obviated, and the seeds are arriving at a due degree of maturity while the barley is growing, without at all injuring either crop. When the clover is depastured, the same process goes on, but to a much smaller extent than during the consumption of turnips. There is the same compression of the soil—the gas—the droppings from the animals—but there is not near the decomposition which occurs in the turnip crop, and greater evaporation of the droppings takes place. The quantity of stock fed per acre being much less than on turnips, the treading of the soil is considerably less. An anomaly, however, exists in the mowing of clover. It is universally agreed, that when a first crop of (red) clover is mown, and the second crop depastured, the soil is in as good condition for a subsequent crop, as if the whole had been depastured. Doubtless, the circumstance of the clover deriving a great portion of its nutriment from the air, as well as its leaves shielding the ground from evaporation of the nutritive matter in the soil, tends to produce this effect. I am willing to admit that this does not seem fully to explain the fact; but if it were asked why the soil was more fertile after growing a bean crop than before, probably much the same answer would have to be given. The depasturation of the second crop of clover, at a period, too, when evaporation goes on but slowly, may be added to the above causes. Two objects are thus served by the clover crop; the soil is again compressed, and an additional quantity of nutritive matter is supplied to the subsequent wheat crop, of which the roots of the clover form no inconsiderable part. By the time the wheat is cut on most soils, there is a formidable array of root-weeds to exterminate. This evil might, doubtless, be lessened, if the hoe were more generally and frequently set to work. No good reason can be urged why it should not be used twice in the spring. It was remarked above that the wheat required a firm seed-bed; and that if it could come immediately after the turnips were consumed, it would be an advantage, because it required a firmer soil than barley. To obviate this difficulty, a variety of means have been adopted. The newest invention is the *presser*, which follows the plough, and compresses the interstices of the plough-seam, on which the seed is sown broadcast. In some cases the land is trodden with cattle after being sown; but in most cases rolling the *surface* in spring is adopted, and generally succeeds sufficiently for all practical purposes.

To shew the complete adaptation of the system to the wants of the crops, it need only be mentioned, that the third crop of the course is consumed before the preparation for the fourth is necessary, and this applies to every crop in the rotation.

It has been and is still asserted, that, under the four-course system, a constant improvement in the fertility of the soil will take place. This, however, is not the case, for although it is perhaps as perfect an alternation of exhausting and fertilizing crops as can be devised, still it is not a rotation of sufficient length to obtain every crop in its greatest perfection. Our turnip crops and our clover are nothing compared with what they once were; they are more difficult to obtain, and less full and luxuriant when obtained, than they were formerly. So much is this beginning to be felt, that some very excellent farmers contend, that the intervention of a fallow occasionally is necessary to keep the soil in that full state of productiveness, which it ought to be the object of every farmer to secure. I pretend not to say whether this state of things proceeds from radical exudations, or from each plant abstracting its peculiar principle from the soil, but the fact is incontestable. A fallow, however, sadly interferes with almost every desirable quality in the system, and is but a robber, because it adds nothing either to the manure heap or the pocket. Gardens which always produce a crop, and occasionally two crops, in the year, are never fallowed; nor is any fallow really necessary on dry manageable soils. By fallow, I mean the complete suspension of all crops for one full year. If a partial or "bastard" fallow can be introduced between any crops, there can be no doubt it will be found useful.

From experience it appears, therefore, that the four-course system,—the system of *change*, in a long course of years, requires a change itself. The turnips and the clover, the mainsprings of the system, are the crops where the deterioration is principally detected,—fail these, and away goes every recommendation of the system; they are the very foundations on which it is built.

Two little illustrations of the course of deterioration occurred under my own observation last year, which sufficiently establish the fact, that fertility of the soil will not altogether overcome the frequent recurrence of the same crops. A turnip-field at Thorpfield was bisected by the Great North of England Railway. The crop was sown with well rotted farm-yard manure, and twelve bushels of half-inch bones per acre. The land was worth about two pounds ten shillings per acre to rent, and had been many years under the four-course system. A corner of the field had to be laid to an adjoining one, intended for turnips. The turnips were pulled off the corner, and the quickwood-fence was levelled, and the roots grubbed up. I conceived, after the dressing above alluded to, it was in much better condition for a crop than the adjoining, now united, field. The whole was sown with turnips, and with the same dressing per acre as above stated, and all treated exactly in the same way. The corner which had been turnips the preceding year, exhibited a poor, dwarfish, unhealthy crop, the bulbs small, and the foliage yellow; the rest of the field good; but the patch where the hedge had been, and which had had no manure for years, but, as we should suppose, was exhausted by the fibres of the thorns; on this spot the turnips were luxuriant to a degree far beyond the best ordinary crop of turnips in the district.

I was travelling in the course of the present spring (May 5th), and met with a farmer who was busily engaged in ploughing over an eaten-off turnip field; I inquired what he was doing at that late period not to have it sown, as the turnips had evidently been eaten off for many weeks. He replied, the field was out of heart, and he was going to make turnips of it again. I replied, I should not be surprised if his crop failed. He looked incredulous, but I pointed to a half broken-up field of clover opposite, sown with beans, and asked how these beans came to be there? He said, because the clover had gone off; it was clover-sick. Yes, I replied; and if you had taken a crop of beans between your turnip crops, you might prevent this field from being turnip-sick. I saw the field in September, and it is a very inferior crop, even in this excellent turnip season, and on land, too, for which I would give two pounds ten shillings per acre. Another instance I will give of clover. From the difficulty of obtaining it, I limed a piece of the best land I have, worth perhaps two pounds per acre, and also manured it, for turnips. The turnips were good, and eaten on the land. The barley was very good. The clover was uncommonly well set, and looked exceedingly well, even up to April, and when the frosts were over. One piece I sowed with gypsum. The whole went off partially, and I had little else but the ryegrass with which it was mixed, to mow for fodder. If a digression may be pardoned, I think this goes far to prove the truth of the radicle-exudation theory. The land was rich: infertility was not the cause of failure. It was limed and gypsumed; principles, therefore, necessary to the growth of clover were supplied, but it went off; nor was frost the cause. Could it be anything but radicle exudation?

The clovers seem to suffer more from the assiduous pursuit of the four-course system than any other crop. This is easily accounted for; they are growing two years out of the four.

The remedies for these evils are of two kinds. The first is an extension of the rotation; to make the various crops less frequent of recurrence, by the addition of a bean (manured) and oat crop, or others, to the end of the course. This, however, is a virtual abandonment of the system, deranges the "*hather*" of the farm, is accompanied by difficulties of cleaning, &c., and seldom produces a crop at all commensurate with the expense of manure, labour, and outlay, as well as often exhausting the soil so far as to render it problematical whether better green crops will be produced than under the evils of the four-course system.

The next remedy is a modification of the system; and it is one which admits of modification to a very considerable extent without materially infringing on any of its distinguishing characteristics. A few hints of the leading features of these shall close this paper.

A section of the land intended for turnips, for instance, may be sown with rape, a section with Swedes, another with spring turnips, as the yellow Aberdeen, &c., and another with winter turnips. The next time the rotation occurs, the Swede and rape pieces should be made yellow and white turnips, and *vice versa.*[*] In the barleys, suppose chevalier and country to be sown, the chevalier piece should be made country, and the country piece chevalier in the next rotation. I have not suggested the substitution of another grain crop for barley, because it seems to suffer least by repetition.

The clovers may be changed in a similar manner; red for white, and white for red. My practice, and that of my father, on my little farm at Thorpfield, has been so invariably; yet we cannot obtain a crop of red clover, and our small seeds (white clover, trefoil, &c.) are by no means good, though the corn crops are improving annually. Tares may be substituted for clover for one course. If they are for eatage, winter tares may be sown in the autumn, eaten off in April, a ploughing given, and spring tares sown for summer eating; or the tares may be depastured or folded through the season; in the former case they will not carry so much stock as the small seeds. For mowing, winter tares may be sown and secured for fodder, say in July. The ground may then be broken up, a ploughing or two given, and thus the land have all the benefits of a bastard fallow; or when a grass field can be mown for fodder, a bean crop may be grown between the barley and wheat with great profit, and also with advantage to the soil. If this be adopted but in one course, it throws the clovers four years more apart. Of wheats, the different varieties may have almost infinitesimal changes rung upon them; but, if serious defects seem to arise in the wheat crop, it is perfectly easy to substitute a crop of oats or pease.

---

[*] And a section of potatoes may alternate with one of any of the kinds of turnips.—EDITOR.

An almost endless variety of changes may thus be cautiously introduced without altering the principal features of the system, which should always be regulated by the wants of the farm and the prices at which the substituted articles sell in the market.

Suggestions have been made of allowing the land to remain two or three years under the artificial grasses. As the deficiency complained of is principally in these, it must be clear, that the more the land is put under them, the greater will be the evil.* It is not in the corn crops *yet*, that the evil is principally felt. I do not say that they will never deteriorate, though I believe there is less liability in them than in green crops; but hitherto their defects are not a matter of complaint.

---

* From the tenor of the foregoing remarks regarding the failure of the clover crop, this is a very natural, though it happens to be not a quite correct, inference, inasmuch as it is not supported by experience. We shall tell the results of experience on this subject in Scotland. The failure of the clover crop has long been felt a grievance in this country, and many devices, as may readily be believed, have been adopted to recover its former state of luxuriance. These devices have consisted of three kinds. 1*st*, The postponement of the recurrence of clover in the rotation is one. Clover was usually taken once in four years; but now it returns once in five, or even eight years. This plan has been chiefly tried on farms in the immediate vicinity of large towns, where green crops of all kinds are in constant demand, and where the existing varieties of green crops have enabled the experiment to be tried. Turnips and potatoes meet with a very ready sale in their respective seasons in such a locality; and although clover is there also sought after with as much eagerness as any of these green crops, yet, as it is only in summer it is an article of food, a substitute may be found for it in summer, in summer tares,—winter tares not being suitable to this climate; and as the making of clover hay may be easily abandoned for a season, it is in the power of the farmer to dispense with the appearance of clover in the rotation until such time it may be thought probable that the land has recovered its sickness by clover. Hence clover may be dispensed with for a time in the vicinity of large towns, though neither turnips nor potatoes can; and this plan has succeeded in partially recovering the former luxuriance of the clover-crop there, where it may now be seen in pretty good state on most farms. But the same plan, it is clear, cannot be adopted at a distance from large towns, where stock must be kept to consume the green crops. There stock become the substitute for the consumption of large towns, and they cannot be maintained at all in summer without grass. Stock, it is true, may be purchased for the express purpose of consuming the winter green crop on a farm; but were such a practice to become universal, there would be no breeders of stock on farms in the

low country where only artificial clover can be cultivated; and where could all the feeders of stock, who are raisers of turnips, find stock in sufficient numbers to consume their green crops? It might be suggested, that the whole stock may be bred on the old grass of the country; but this plan would be impracticable in a country where no old grass-land is preserved in the arable districts, and where the stock *must* be maintained on the sown grasses, and where those grasses must therefore constitute part of the usual rotation of crops, and in which, of course, they must occur as frequently as the rest of the crops. 2*d*, Another plan for recovering the luxuriance of the clover-crop is by manuring the land much more liberally than formerly; and as this has been effected, to a certain extent, in every part of the country, the clover-crop has been found to improve in consequence of the more liberal treatment it receives, and especially in the neighbourhood of large towns, in conjunction with the plan detailed above. 3*d*, But the third plan is that which has succeeded most effectually at a distance from towns, where green crops cannot be sent to market, and where large quantities of extraneous manures cannot be easily obtained, to recover the luxuriance of the clover-crop; and this plan is that which Mr Milburn deprecates, namely, the putting the land longer under the artificial grasses. At a distance from towns, two years were a very common period for the grass division of the rotation to remain, and on many farms it is so still; but from three to five years are now found by breeders of stock to be a much more eligible period. It is found that land becomes more ameliorated,—that is, more fresh, more fertile, more rested,—by being a longer time under the grass division than one year, or even two years; by being kept, in fact, a longer time from the disturbance of the plough. What may be the true reason that may be assigned for the amelioration of land by grass, it is not easy to discover. The theory of exudation from the roots will not of itself explain it, as why should clover thrive better on land that has been a long time than a short time in grass? But whatever theory may explain it, there is no doubt of the fact. However paradoxical it may seem to state it, as a general principle, that the repetition, or rather duration, of a crop which the land is tired of growing, is the best means of inducing that land to grow it the more luxuriantly, there is no denying the soundness of the principle in regard to clover; there is no denying that, where the experiment of allowing clover to remain for a number of years,—that is *white* clover, for *red* clover is only available for one year,—to be depastured by stock, has been tried, there the growth of red clover has become almost certain. And we would say that it is well for the country that this result has happened; for, now that the rearing and feeding of stock pay the farmer much better than the raising of white crops, it is for his interest to retain as much of his farm under grass as will suffice to supply his stock with a sufficient quantity of provender, and thereby always retain in his land a fresh store of fertility.

With regard to the four-course rotation,—that is, the raising of a white

ON THE STATE OF THE POOR, AND ON A LEGAL PROVISION FOR THEM.*

In our former article on Mr Alison's work on Population, we confined ourselves almost exclusively to the preliminary sections, which treat of the increase of the human race in early times, and of the relations subsisting between population and agricultural subsistence. We then shewed, that the author combats with great argumentative acuteness the positions of Mr Malthus; and, from the past history of the world, adduces numberless instances to prove that they are not founded on fact;—and that no possible increase in the ratio of population can ever keep pace with the increase of subsistence,—provided always that the earth, accessible to the cultivators, will admit of an increase of produce.

Mr Alison then proceeds to point out the changes in the

---

crop every other year,—whatever the climate of England may be able to do in support of it, it is one which that of this country cannot support on any farm, however good, situated at a distance from a large town,—the source of unlimited supplies of extraneous manures. Where manure to the extent of from sixteen tons to thirty-two tons per imperial acre may be applied, and that is the rate of dunging in the neighbourhood of Edinburgh and other large towns, it is quite possible to pursue it, but no farm of this country could practise it on its *own resources*. The straw off two acres will not sufficiently manure one, and, that being the case, without extraneous assistance the fallow division of a four-course shift cannot be manured as it ought to be. We may mention, in conclusion, that the alternation of crops on the same part of the land is rigidly followed in this country, that is to say, care is always taken, in the repetition of crops on the same ground, to vary them, by having Swedes on land that had in the former course raised white turnips, or potatoes, or beans, or tares, as the case may be, and so with barley and wheat; and yet, with all these precautions, red clover became a worthless crop, and would no doubt have continued to be so, had not the plans detailed above been tried as expedients; and fortunately, in the hands of skilful farmers, they have proved successful to a certain degree. But no doubt the time will arrive when these new expedients will also fail to produce the effects they are now doing, and then the farmer's ingenuity will again have to be taxed to devise others in conformity with the circumstances of the times.—EDITOR.

* The Principles of Population, &c. By ARCHIBALD ALISON, F.R.S.E., &c.

progress of society which limit the principle of increase; and ably shews, that these arise from moral restraints, the development of the human reason, the influence of artificial wants, the desire of accumulating property, ambition, the distinction of ranks, and the mortality among congregated masses of mankind, as in great cities. After adverting at some length to the circumstances in society which limit the demand for labour, and the modification which these principles have received from the influence of human corruption, our author ventures on the discussion of the grand topic, the decay and renovation which are continually shewing themselves in different portions of the globe; and concludes the first great division of his book, by an investigation of the principle of increase as exhibiting itself in the East, in Europe, and in the United States of America.

In opening the second volume, we come to matter more germane to the spirit and objects of our Journal; and in our present article shall confine ourselves to the three first sections, —the one dedicated to the acquisition of landed property by the poor,—the second to the moral evils and management of the poor in great cities,—and the third to the at present important and much agitated question—a legal provision for the poor,—all three equally important to the proprietor and the agricultural tenant.

The great obstacle to human improvement and happiness in savage life will be found in the indolence and improvidence characteristic of the earlier stages of society—the former preventing those vigorous efforts at all times necessary, but more especially ere governments have assumed a settled form, and when man is compelled to struggle with many physical difficulties;—and the latter, which, disregarding the future for the enjoyment of the present, prevents the acquisition of general views for the regulation of conduct, and brings on the production of a population without either habits of industry or adequate means of subsistence.

The most important change, therefore, which takes place in the early history of the species, is the division and appropriation of land. This, and this alone, can overcome the habitual indolence of the savage state, can induce men to submit to labour and fatigue, check the disposition for wandering, and confine the wishes to one spot. The accustoming men to continued labour, and a certain return for it, is that which makes them look to the future, and shews them the effects which their own exertions are capable of producing over their own happiness. It should also be remembered, that from the appropriation of land arises our love of home, and our attachment to the place of our nativity—a passion strong in the human breast in the savage state, and which no citizenship of the world among the highest and most enlightened can ever either wholly eradicate or extinguish.

In every part of the world, accordingly, the appropriation of land has been the first step to improvement, and the first impulse to exertion; and no period in the civilization of a people is so important as the transition from the pastoral to the agricultural life.

In reference to this subject, Mr Alison beautifully and truly observes,—

> "As the division of land is thus the great step in the progress of improvement, so its distribution among the lower orders, in civilized society, is essential to maintain that elevation of mind which the separation of employments has a tendency to depress. It is too frequently the melancholy effect of the division of labour, which takes places in the progress of opulence, to degrade the individual character among the poor; to reduce men to mere machines; and prevent the development of those powers and faculties which, in earlier times, are called forth by the difficulties and dangers with which men are then compelled to struggle. It is hence that the wise and the good have so often been led to deplore the degrading effect of national civilization: that the vast fabric of society has been regarded as concealing only the weakness and debasement of the great body by whom it has been erected; and that the eye of the philanthropist turns from the view of national grandeur and private degradation, to scenes where a nobler spirit is nursed, amid the freedom of the desert or the solitude of the forest. To correct this great evil, Nature has provided various remedies, arising naturally from the situation of man in civilized society, and one of the most important of these is the distribution of landed property among the labouring poor. It is this which gives elevation to the individual character: which gives a feeling of independence to the industrious labourer, and permits the growth of those steady views and permanent affections, which both strengthens and improves the human mind. It is this, in short, and this alone, joined to the religious and moral education of the great body of the people, which

is adequate to counteract the degrading effect of national civilization upon the poorer classes; which can permit the growth of the human mind to keep pace with the advancement of knowledge and the progress of general improvement; and enable the poor to retain, in periods of wealth and civilization, the individual character and the station in the community which belonged to them when society existed in a more simple form."

The beneficial effects resulting to the lower orders from the acquisition of a little landed property are too obvious to require a particular examination. These effects are everywhere alike; and we perceive them as conspicuously in the poor cottages of England, as in the peaceable inhabitants of the American wilderness. Motives are thereby offered for industry, frugality, and foresight, permanent views for the conduct of life, and incentives to habits of sobriety and order.

It is not a little curious that Lord Brougham, in his youthful work on Colonial Policy, should have maintained the same doctrines here inculcated by Mr Alison; as he there expressly says, that "the honest acquisition of a little property, and its attendant importance, is, beyond any other circumstance, calculated to reform a needy man, by inspiring him with a respect for himself and a feeling of a stake in the community, and by putting a harmless and comfortable life at least within the reach of his exertions."* Even the authors most decidedly hostile to the minute subdivision of land among the labouring classes, admit its beneficial effects upon the individuals to whom it is granted; and Malthus and Arthur Young, while they seem alive to the danger of thus inducing too large a population for the future, admit its advantages to the present possessor.

The benefits of property in inducing industrious habits seem thus generally admitted; but the more important effects of establishing habits of moral restraint and frugality seem to be more disputed, although for no very adequate reasons. One of the greatest causes of redundant population will be found in improvidence with regard to the future; and this is always known to exist to the greatest degree among the poorest and most degraded classes of society, among those who have no fixed object in life, and who never look beyond the wants or the gratifications of the current day. The only cure for this is a *permanent object*,—something for which it may be worth while to sacrifice present desires. Accordingly, when we rise in the scale of society, we find new desires operating, and very different views entertained with regard to the conduct of life. With the acquisition of a little property, we find habits of prudence and foresight, systematic views acted on, and the spring of population restrained within the bounds which the interest of the individual and the consequent general welfare require. Even the influence of artificial wants is another of the means which operate powerfully in the modification of the principle of increase. *A fortiori*, therefore, the more we raise the lowest classes in the scale of society,—and that can by no other means be so efficiently done as by the acquisition of a little property,—the more we promote the development of the principles leading to moral restraint, and the more we check a vicious redundance of population. The following reflections of Mr Alison are equally beautiful and true.

---

* A strong and amusing illustration of the truth of this position occurred a year or two ago in a political contest for some northern burghs. In the first election after the Reform Bill, a newly enrolled voter declared at once for the radical candidate as the exponent of his own principles; but being asked by the same gentleman for his vote during a subsequent canvass, he said naively, "No, no; I am not now a radical, for I have a cow."

"To improve the habits and enlarge the ideas of comfort among the poor, the acquisition of property of any kind is of great importance; but the effects of landed property seem to be beyond any other. There is something healthful to the human mind in the possession of a portion of the earth. Property of other kinds is easily squandered or dissipated, and never can give rise to those feelings of attachment which spring up in the minds even of the lowest of mankind with the acquisition of property in land. The incessant labour which it requires; the habits of solitude or of domestic society to which it gives rise; the permanence of the object itself; all tend to introduce habits of foresight and attention, and to check that propensity to present indulgence from which so much misery arises to the lower orders. And in so doing it promotes, more than any other species of property, the growth of those dispositions and habits which restrain the operation of the principle of population.

"The great difference between the effects of property in land and in money upon the human character, consists in the superior facility of dissipation which the latter possesses. The proprietor of a field cannot convert it into money, or render it the means of indulging individual gratification without disposing of it to a purchaser, or burdening it with debt. But either of these is a great and decisive step, sometimes drawing after it a change of residence, an alteration of employment, and probably the sacrifice of habits and feelings of attachment. Men pause before they take so serious a step, or indulge in the habits likely to render it necessary. But the case is totally different with the possessor of a sum of money: it melts away insensibly with the indulgence of tastes for dissipation, and can be entirely spent without involving a change of home, a sacrifice of affection, or alteration of employment. Every person must have felt himself, or witnessed in others, the great difference between the facility with which an individual in the higher ranks draws on a bank or spends money in his possession, and disposes of his estate, or sells out of the funds: and hence the importance which the friends of every man of improvident habits attaches to getting part of his professional earnings invested in land, or a house, or some other permanent object. The same principles operate with still greater force upon the poor, in whom habits of foresight are much slighter, and the desire of momentary gratification much stronger, than in their superiors; and hence the value of encouraging these habits, and counterbalancing these desires, by the strong feeling of attachment to home and landed property which are equally powerful in all mankind."

The great national evils, therefore, resulting from a manufacturing state will be found to originate in the carelessness, recklessness, and profligacy which it is invariably apt to engender, and which naturally arises from an unnatural concourse of persons, and the contagious nature of vice among the poor. Manufacturing labourers thus often grow up without any settled habits or permanent objects, squandering their earnings in prosperity, and suffering in periods of adversity all the miseries of improvidence. The only cure for this malady of the mind is the creation of something to make it *worth while to resist present indulgence*; and none seems equal in efficacy to the prospect or the power of obtaining property in land. It is confessedly nearly impossible to prevent the bad effects resulting from the varied intercourse and crowded population of commercial cities; but much may be done and has been done, as in Yorkshire, Westmoreland, Flanders, and Switzerland, where manufactures are established in the country, by distributing small portions of land, and exciting the desire of purchasing them among the labouring poor, to a degree that may increase their activity and industry in their several employments, and render them at the same time more virtuous, orderly, and provident.

In England, the distribution of property in land has been strongly advocated by the Society for bettering the Condition of the Poor, who recommended it in the most urgent manner as the most valid step which could be adopted for permanently ameliorating the condition of the lower orders. In Lincoln and Rutland shires, the greatest practical good was found to result from giving cottagers grass for a cow; these cottagers being generally found orderly and industrious, and supporting themselves either entirely without, or with very little parochial assistance, even in seasons of the extremest scarcity. The same fact is stated by Mr Kent in his Agricultural Survey of Norfolk. On the estate of Lord Winchilsea in Rutland, the poor have, for 200 years back, been accommodated with small portions of ground, sufficient for a garden and a cow, with the most striking and beneficial effects. In the parish of Lavington, in Somersetshire, opposite systems have, from time immemorial, been pursued, in regard to the tenantry, by two great proprietors, Lord Grosvenor and the Duke of Marlborough. On the one estate, the poor were all furnished with pieces of ground, and such has been their state of comfort and opulence, that scarcely any applications for parish relief from thence are on record; while, on the other, poverty and indigence are general, and almost all are obliged to have recourse to parochial assistance.

In the West Riding of Yorkshire, and in Lancashire, it has been the custom for a long time to carry on manufactures in the dwellings of the people themselves, the cottages being furnished with garden-ground, and grass sufficient for the maintenance of one or more cows; and the good effects of the system are visible, not merely in the superior sobriety and good conduct of the labourers, but in their increased comforts of every kind. Accordingly we find among them a number of little freeholders and copyholders; and, as in the case of the *statesmen* of Westmoreland, they are distinguished for their regular habits and independent spirit.

Beneficial, however, as the subdivision of property can be shewn to be in this country, it is to the Continent of Europe we have to look, to be made at once aware of its consequences, when tried on a great and general scale. So early as the days of Machiavel, it was remarked by that profound observer, " that the French peasantry enjoyed greater comfort than any other in Europe, because there was hardly a peasant who had not a little heritage of his own, which he could bequeath to his children." This happy state, which was broken in upon by the French Revolution, and which, in the case of a proprietor, left him little more than a third of the produce of the soil, rendered France productive of a numerous population, destitute of the comforts, and insensible of the desires of civilized life. But the sale of the national domains having again extended this minute subdivision of property over almost all that kingdom, the same excellent effects are again resulting from it. In the Pays de Vaud, also, and all along the shores of the Lake of Geneva, this minute subdivision of land has existed from time immemorial. On this subject Baron de Stael says, "Around my dwelling the land is divided to such a degree, that the greater part of the properties are below an acre; yet it may be safely affirmed, that no part of Europe offers a similar picture of prosperity. So far from there being any redundance of population, the wages of labour are there higher than on any other part of the Continent. The charity of the opulent classes can hardly find objects of misery to relieve; and the succour which they give would be rejected if offered by a supercilious hand. Independence and prosperity universally prevail." Mr Cox gives the same description of the Canton of Zurich; M. Simond, of the Lower Val D'Arno, from Florence to Pisa; and Dr Clarke of Sweden and Norway. Even of Lapland and Finland, where the same system obtains, Acerbi says, "Every peasant has a property in land attached to his dwelling, and abundance and contentment reign in every domicile."

Passing over the illustrations to the same import from Flanders and Holland, Upper and Lower Austria, in Biscay and Hindostan, Mr Alison comes to the conclusion, that, if the condition of the lower orders be attentively considered, it will be found that the division of land, accompanied by due protection to the cultivator, is the measure of all others most likely to diminish or remove the burden of poor's rates. The casualties of life are the great cause of the wretchedness which drives the poorer classes upon legal relief. Manufacturers thrown out of employment by the vicissitudes of commerce; workmen left destitute from the stoppage of public, or the stagnation of private enterprise; children thrown upon the world by the death of their parents, in places where they are unknown; widows bereaved of their support by the loss of their husbands; women betrayed by the treachery of men, or deserted when burdened with an infant offspring: these are the persons who fall upon the charity of the benevolent; and, when accumulated in great numbers, render some legal relief unavoidable. It is the total want of property which makes these casualties so fatal to the poor, and converts the misfortunes of the higher into the destruction of the lower orders. Were these people possessed of property, however small, in land, they would find an asylum amidst the vicissitudes of life, and possibly might only be excited to additional industry, and trained to severer habits by misfortunes, which, without such support, by rendering them desperate, drive them to beggary, dissipation, and despair.

The necessity, in truth, of a legal relief for the poor, is the natural consequence of the unequal distribution of wealth in the advanced stages of society, and springs from the absence of that property altogether among a certain proportion of the lower orders. Where a certain degree of opulence exists among the higher ranks the poor are drawn in great numbers into one place, from the concentrated demand for their labours thus and there occasioned; and the necessity for legal relief is immediately felt. A large proportion of these unfortunate beings must be maintained by the upper classes, either through the channels of private charity or public assessment. Hence the origin of poor laws.

The system of the allotment of small portions of land to the poor is admitted by Mr Alison as one which, in the present circumstances of British society, it would be most difficult to carry into effect; but, as it is one of the greatest steps towards the well-being of the peasantry, he thinks it may reasonably be presumed, that some provision for the establishment of such a system will be found in the natural progress of opulence, and that its blessings may be diffused throughout society, without any injustice to the actual possessors of the soil.

As the acquisition of wealth immediately gives birth to a multitude of desires, which again tend to its dispersion, the extravagance or imprudence of part of the landowners annually brings a certain proportion of their property into the market, where it is anxiously sought after and bought by the interim possessors of money; and thus many great estates are broken down into small portions, and disposed of to the more opulent of the middle ranks. In progress of time, these proprietors being exposed to the same vicissitudes, their estates are successively divided, until they come within the reach of the labouring classes, and it is by these alienations that a peasantry, at once free and independent, are preserved among us.

Mr Alison makes a curious remark in reference to this subject, which is, that the portions of landed property purchased by the labouring classes is generally at a higher price than what would be given for it by the extensive holders of land, who look to a certain per-centage of return as authorizing their outlay; but he maintains, and we think justly, that still such purchases are a positive gain to the small holders of capital, as a permanent investment is thus found, and as, however small the return for money so applied, it is often the means of preventing the whole from having been spent in the alehouse or squandered at the gaming-table. Land, indeed, should be considered as the great place of deposit for the savings of all ranks; and every institution which prevents the free circulation of estates, is prejudicial, not only to the class of proprietors, but to all ranks of the community. Hence Mr Alison condemns the law of entail as highly impolitic, and an evil of the first magnitude, as it hinders the lower orders from acquiring that degree of solidity and that connection with property, which is the only sure foundation of public prosperity.

Mr Alison next proceeds to another great section of his subject, which he treats with his usual knowledge and ability, "On the moral evils and management of the poor in great cities;" but, as this dissertation is not so immediately connected with the main purposes of this Journal as other parts of the work which yet remain for us to notice, we shall barely advert to its principal subdivisions. After shewing in glowing colours, yet redolent of truth, the fearfully contagious influence of vice in great cities,—the misery and wretchedness thus engendered,—and the total inadequacy of private charity and benevolence to relieve that misery and wretchedness, he proceeds to exemplify the total failure of the voluntary system, so fairly tried in Glasgow, and the causes of this failure, which were not of a casual but of a permanent class. After some convincing arguments regarding popular instruction, as affecting only a limited number, and therefore insufficient to exert a beneficial influence on the whole of the great popular mass, Mr Alison then insists on the necessity of enlisting the active propensities on the side of virtue, and details some of the more prominent counteracting influences that should be brought into play. As an indispensable preliminary, he insists on the raising the duties on ardent spirits,—the use or rather abuse of intoxicating liquors being one of the most extensively operating causes of the moral depravity and pauperism of the lower orders. The improvement, by public authority and aid, of the worst part of crowded streets and alleys is next considered,—then the rigorous, just, and expeditious administration of criminal law,—the great value of the punishment of transportation,—the general system of emigration for the poor at the public expense,—establishments for giving the people the means of saving,—and the uniformly beneficial effect of private charity. The following observations are at once so beautiful in themselves and so honourable to the head and heart of the writer, that we cannot help extracting them, more especially as so many erroneous and ungenerous ideas prevail on the subject.

"To refuse relief to the poor, therefore, with a view to spread the terrors of poverty, and check the increase of numbers among the lower orders, is the most impolitic of all measures; because it defeats the precise object which is hoped for from its adoption. It aggravates private suffering, without diminishing public distress: it leaves the individual to perish, without lessening, but, on the contrary, rather increasing the numbers of those who are to become the victims of similar misfortune. It renders the people desperate, from a belief that their miseries are without a remedy, and generates poverty from the most prolific of all sources—indifference to the future among the poor. It is intended to prevent distress, by displaying its evils; it has the effects of producing it, by habituating to its terrors.

"The relief of the poor, on the other hand, is founded alike on justice and expedience. If the evils of poverty are infinitely multiplied in civilized life by the numbers of the poor who are accumulated together, equity demands that a portion of the wealth which their labour has produced should be devoted to their relief: if ruinous or profligate habits unavoidably attend such assemblages of the lower orders, humanity enjoins that a lenient eye should be thrown upon their failings. Nor is such conduct inconsistent with the best interests of the community. By relieving suffering, the destruction of an individual, frequently of a family, is obviated; by preventing distress from becoming excessive, the contagion of poverty is arrested, and the dread of falling into its difficulties preserved. The more extensively that relief is administered to the poor, the more is the standard of comfort supported, because the fewer are the victims of distress who are exhibited: the more that misery is relieved, the more is its reproduction rendered unlikely. Charity is intended to assuage suffering,—it has the effect of preventing it; it is suggested by private distress,—it produces public advantage.

" To those who have considered the intimate connection which everywhere subsists between the instinctive feelings of our nature and the interests of humanity, it will readily occur, that a propensity so strongly and universally implanted in the human heart as that for the relief of suffering, cannot be attended with dangerous consequences; and that in yielding to the best feelings of our nature for the happiness of an individual, we cannot be doing what is injurious to society. To those who recollect how frequently and earnestly it is enforced in Scripture as the first and greatest of the social duties, it will require no argument to prove that an injunction flowing from Divine authority is calculated to produce beneficial consequences. It is consoling to reflect that the conclusions of philosophy in this, as in other instances, are in unison with the feelings of humanity; and that the individual, in attending to the dictates of his own heart, or the Christian, in obeying the precepts of his religion, is lending his little aid, not only to the relief of individual distress, but to the general improvement of the social system.

" Let not, therefore, the humane doubt the tendency of natural instinct, or the selfish shelter their inhumanity under the cloak of philosophy. The interests of the individual are inseparably blended with that of the society to which he belongs: the feelings which spring in the heart from the sight of suffering, prompt the course best adapted not only for its relief but its prevention. The same Invisible Hand which provides in the growth of parental affection for the preservation of the species, has opened the fountains of mercy in the human heart; and, following the stream of beneficence through all its wanderings, renders it the means of blessing alike the hand which gives, the sorrow which supplicates, and the misery which is assuaged."

We next come to the consideration of a subject of first-rate consequence in itself, and, at the present moment, one of much argumentation and controversy—we mean that of a legal provision for the poor. It is one well worthy the serious and immediate attention of the landed interest more especially; as, to a surety, measures are now in preparation for altering the system of our forefathers, and amalgamating it in many respects with that at present obtaining in England. By all means let there be inquiry,—let there be a full and free discussion of the subject in every county and in every district; and, if alterations are rendered necessary from the altered circumstances of the times, let these be adopted. A voluntary maintenance of the poor, according to Dr Chalmers's plan, and in a national point of view, we regard as perfectly Utopian; but, on the other hand, we must beg to remind Dr Alison, the able and excellent brother of our author, that, however strong may be the case he has undoubtedly made out regarding the present exigencies in town-populations, it by no means holds in any thing like the same degree in the rural districts,—as, in many of these, to this moment, pauperism has scarcely ever been known to exist, and legal provision is a thing unheard of.

In discussing this important subject, Mr Alison notices the recent changes in public opinion with regard to the expediency of Poor Laws. For more than a century nobody doubted their usefulness, but, in more recent times, political authors of the greatest ability have censured them as blemishes in our political system. It has been urged by these writers, that the legal relief of distress is destructive to the moral habits of the people, and creative of more misery than it assuages. Mr Alison adopts different views, and defends their expediency on three separate grounds—first, the absolute necessity for them where society exists in a complicated form,—secondly, their beneficial effects upon the present objects of distress,—and, thirdly, their salutary tendency to counterbalance the inequalities of property, and prevent a diseased action in the principles of population.

Mr Alison satisfactorily proves, that, in the earlier stages of society, the necessity of a legal provision for the poor is not experienced, there being but the masters and their vassals, the former class of whom are obliged to support the latter. It was only with the growth of freedom in modern times that the burden of the poor began to be felt. It was unknown during the reigns of the Plantagenets in England, and of the earlier Stuarts in Scotland; but it became oppressive and intolerable in both countries soon after the emancipation of the peasantry deprived them of their claim for support from their feudal lords, and the suppression of the monasteries cut off the sources whence mendicity was maintained. Hence, about the same time arose the statute of Elizabeth in England, and the act of 1579 in Scotland, from the common suffering then experienced, and for the relief of an evil then immedicable by lesser remedies. In some favourable situations, such as the districts where the class of proprietors is considerable compared to that of indigent labourers, the necessity of a legal provision, it is admitted, may be a long time of being felt, even after the emancipation of the lower orders from rural or domestic servitude. Where manners are simple, manufactures rare, and landlords resident, the rural population may subsist for a long time with no other support in distress than voluntary charity; but the case is widely different when society assumes a complicated form, when cities accumulate wealth, and indigence is attracted to them by its glare;—where the poor know not their superiors, and opulence is severed from the hands which created it—where humanity shuns the misery which it cannot relieve, and religion recoils from the vice which it cannot subdue. Here mendicity advances with a frightful pace, and the means of relieving distress are totally disproportionate to the multitudes who clamour for it. Misfortunes and disease add hourly and daily to the number. Parents leave numerous and unprovided-for families, and the vicissitudes of commercial life paralyze the labours of thousands. In these circumstances, to trust the support of the poor to the voluntary offerings of the rich, is to leave them to those who neither can nor will maintain them.

From the encouragement of prosperous years, the poor are collected in manufacturing districts to such an extent that voluntary contributions from the rich are wholly inadequate to afford them relief. The great mass of human suffering and deprivation is to be found among those who have no natural connection with the people among whom they are placed. They have been brought from different quarters, have lost the persons on whom their dependence was placed, and are strangers to all save their own indigent circle.

But the increase of pauperism is not entirely owing to commerce and manufactures. It will be found to prevail wherever there is a great inequality in the distribution of property.

In some states it is disregarded, although never without ultimate and merited retribution; in others it is left to the care of the church, or of charitable establishments; in all it is to be found. Ireland shews to what a prodigious extent it may prevail, and from this cause—the unequal distribution of wealth in a country almost wholly agricultural; and Naples demonstrates that mendicity may spread with the growth of opulence. Poor laws are therefore found to exist in almost every Christian country, and have even been long in operation in many Mahometan states. Indeed, experience has long justified the profound saying of Dr Johnson, that "a decent provision for the poor is the true test of civilization."

From the accumulation of wealth in the hands of a few, and the multiplication of labourers in the advanced periods of society, the necessity of poor-laws arises. It is not to be supposed that the rich, in countries like England, Scotland, France, Switzerland, Austria, Flanders, Norway, and so many other states, would concur in submitting to so grievous a burden, if at all avoidable. In England, during the late war, the poor's rates amounted to more than half the income-tax; and, notwithstanding the utmost efforts of the landed proprietors, it has been found impossible to dispense with them in Scotland, wherever manufactures have been established.

The advantages of a compulsory assessment for the poor are equally beneficial to those who pay and those who receive. It tends to equalize the burden of maintaining the indigent, which would otherwise fall exclusively on a limited class; and it is also evident that the sum realized by an assessment must even be very much larger than that from a subscription. The former will be ten times greater than the latter, for the obvious reason that it reaches the selfish as well as the charitable. "Experience," says Mr Alison, "has demonstrated that the latter are at least five times as numerous, and ten times as opulent, as the former; when, therefore, the necessity for imposing a burden has arisen, it is the height of injustice to let that which should be borne equally by all fall exclusively upon the class who are least able to bear it."

It is also worthy of remark, that the rich, even when charitably disposed, seldom come forward for the relief of distress in proportion to their fortunes. A man of L.1000 a-year gives a guinea to a subscription; but a man of L.10,000 does not, for the same purpose, give ten. It is even calculated, that, for purposes of real charity, the rich do not give so much as *one-fifth* of what the middling classes contribute. Paradoxical as it may appear, people of moderate income have more wealth at their command for the purposes of charity, and bestow it more cheerfully, than those of the greatest fortunes. A nobleman hesitates before he gives a few shillings to an object in distress, while the Irish cottar will share his last meal with the stranger who seeks shelter in his hovel. Indeed the voluntary system in regard to the poor may be correctly designated " A system for the better relief of the opulent and selfish, and laying the whole burden of the poor, whom they have created, on the charitable and humane."

A legal provision for the poor also tends to prevent that degradation of the lower orders, which arises from the necessity of soliciting individual charity; and that unequal distribution of relief, which results from the unwillingness to submit to its humiliations. It may be said, likewise, to prevent them from sinking into that state of utter wretchedness, which leads to immediate crime, and ultimate dissolution of manners.

In an opulent state of society, voluntary charity is liable to a most distressing degree of uncertainty, and this necessarily arises from the character of the persons from whom it is obtained. Relief to a certain amount may be relied on; but extraordinary supplies never, except by some catastrophe affecting the imaginations of the people, as conflagrations or famines, and these only while the immediate excitement continues. When that subsides, the impossibility of thus relieving lasting distress becomes more apparent, and the uncertainty thus produced is in the highest degree prejudicial, as it naturally engenders reckless habits, and leads to a diseased increase of population. Thus charity, bestowed in regular pensions, is incomparably more beneficial than the same sum gifted in larger, but irregular, donations; and hence a great superiority in a legal provision for the poor to voluntary charity. " A soldier," says Mr Alison, " leads a comfortable life upon a shilling a-day, regularly paid at the close of the week, during the period of his service; but he is frequently ruined by a Chelsea pension, awarded at its termination. The latter, like the prize-money due to sailors, is paid in large sums at stated periods, by the government officers; a week of uninterrupted intoxication generally follows the day of payment, and months of squalid inactivity follow a few days of licentious enjoyment."

We thus find that voluntary charity is an invaluable *auxiliary* to legal support, but a most inefficient *substitute for it*; and to this we may add an important advantage, clearly in favour of the latter, which is this, that a legal maintenance is capable of being enlarged and contracted according to the necessities of the people, whereas voluntary charity at times provides too little, and at others too much.

The most important effect of the poor-laws, however, will be found in their influence to prevent the growth of those habits from which a redundant population takes its rise; and it is melancholy that gross misconceptions should be so generally prevalent on this point.

If we examine the different nations of the world, it will be seen that extreme poverty is accompanied by general improvidence; and that, in the wreck of all other hopes and enjoyments, physical desires become irresistible. Nothing, therefore, encourages a redundant and miserable population so much as the existence of unrelieved suffering; and nothing will be found to check it so effectually as those institutions provided for the timely relief of distress. The great check upon population among the rich is the fear of falling; and among the poor the hope of rising.

It has been said by Madame de Stael, that there are but two eras in human affairs,—that which preceded, and that which followed the establishment of Christianity. So emphatically is the duty of Christian charity impressed upon mankind in the New Testament, that our Saviour may be said to have come into the world chiefly to enforce its performance. For its neglect no excuses will be received; and by its discharge "a multitude of sins will be covered."

We find that our limits prevent the extension of this article; but much valuable matter for remark yet remains, especially in Mr Alison's views regarding "the Corn-Laws," and the "Future Increase of the Human Race." Our observations on these topics must consequently be deferred till our next Number.

ACCOUNT OF THE MEETING OF THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND AT ABERDEEN IN OCTOBER 1840.

The annual meeting under the auspices of the Highland and Agricultural Society of Scotland was held this year at Aberdeen, on Wednesday the 8th of October last. As on all such occasions, the local arrangements preparatory to the exhibition were made by a committee of gentlemen, members of the Society, connected by property and interest with the district immediately supplying the materials out of which the largest portion of the Show is supposed to be constituted. The district on this occasion comprehended the counties of Aberdeen, Banff, and Kincardine, all which contributed active and zealous members to the local committee. Without derogating from the laudable exertions of committees in other districts in which these annual meetings of the Society have been held, we must award our meed of unqualified praise to the simplicity and neatness with which the Show-Yard was fitted up at Aberdeen. The pens were neatly subdivided with hurdles made on purpose; and the stock were arranged in groups, according to their kinds and breeds. Thus all the horses were placed together, being subdivided into stallions, mares, fillies, and extra stock. So were the cattle placed together, and by breeds, which were again subdivided into bulls, cows, heifers, and oxen, every breed thus forming a group by itself, and constituting an object of comparison with other breeds. The extra stock of cattle were placed by themselves, consisting of cows, heifers, and oxen. This was a much simpler and more perspicuous arrangement than when the different breeds were mixed together according to gender and nature. Thus arranged, the stock occupied these spaces respectively. The horses 77 pens, consisting of 26 stallions, 23 mares, 12 fillies, and 16 extra horses: The short-horn cattle 63 pens, consisting of 36 bulls, 17 cows, and 10 heifers: The Aberdeenshire horned breed 17 pens, consisting of 2 bulls, 6 cows, and 9 oxen: The Aberdeenshire, Angus, and Galloway polled breeds 70 pens, consisting of 18 bulls, 18 cows, 21 heifers, and 13 oxen: The

West Highland breed 24 pens, consisting of 3 bulls, 9 cows, 6 heifers, and 6 oxen: Cross-breeds, 12 pens of oxen: Any breed, 10 pens of oxen: And extra cattle 31 pens, consisting of cows, heifers, and oxen. The cattle thus occupied 227 pens. But there were a greater number of heads, inasmuch as the pens for oxen generally contained more than one ox each. The sheep occupied 53 pens, consisting of Leicesters, Black-faced, Cheviots, Southdowns, and crosses; and the swine 43 pens. In all, the stock occupied 400 pens. It may be worth mentioning, that the pens containing the horses and cattle, which occupied the circumference of the show-yard, extended to a length of 728 yards, making a rectangle of 237 by 127 yards, and including an area of 6 acres, 35 perches, imperial measure. The pens for the sheep and swine were erected on the ground in the inside. The outer fence of the show-yard, which was situate at the foot of the Broad Hill, was formed of strong posts of about 10 feet in height, stoutly boarded with deal. The exhibition of roots and seeds, butter and cheese, and wool, was held in one of Edgington's spacious and elegant tents, 120 feet by 30 feet. There was a gallery for the ladies, 60 feet by 20 feet, over the Committee and Judges' rooms and the Refectory. The stage for the exhibition of the stock which obtained the prizes was 65 feet by 17 feet; and the implements were exhibited on the ground. There were three entrance gates, one for horses and all produce and stock conveyed in carts; another for short-horns and all extra stock; and the third for the rest of the stock. Two water-tanks, supplied by pipes from the town, afforded water to the stock. The outer fence was protected with a fence of posts and rails on the outside, and the county horse-patrol paraded within the fence to keep off the crowd, and a pôsse of constables were stationed at each of the doors to prevent unnecessary confusion at the entrance of stock and the spectators. A number of people availed themselves to enter the show-yard at 2s. 6d. when the Judges were busy at work; but the great mass of the people came in after 12 o'clock at one shilling a-head. The money collected at the doors amounted to L.528; which, with the people that took charge of the lots and the officials, would indicate the presence of at least 11,000 people within the show-yard at one time, while perhaps a still greater number had a view of the show-ground from the Broad Hill.

The local Committee and the deputation of Directors, under the presidency of the Earl of Aberdeen, held a preliminary meeting in the Town-Hall on Wednesday, the day previous to the show, for the purpose of appointing the judges of stock and other articles brought forward in competition, and the various sub-committees to undertake the numerous and onerous duties to be performed on the day of the show. These are the names of the gentlemen appointed judges of the respective departments of competition.

OF CATTLE.

Short-horn Breed.—The Marquis of Tweeddale; Mr Crofton, Holywell, Durham; Mr Heriot, Fellowhills, Berwickshire; Mr Chrisp, Sandy Knowes, Berwickshire.

Aberdeenshire Breed—Horned and Polled.—Mr Hunter, Blyth, Berwickshire; Mr Hogg, Mornington, East Lothian.

West Highland Breed.—Mr Macdonald, Craigruie, Perthshire; Mr Carmichael, Raploch Farm, Stirlingshire.

For Crosses and any Breed.—The Judges of the Short-horns.

OF HORSES.

Professor Dick, Edinburgh; Mr Stephens, Editor of the *Quarterly Journal of Agriculture*; Mr Wetherell, Durham; Mr Watson, Keillor.

OF SHEEP.

Black-faced Breed.—The Judges of the West Highland Breed of cattle.

Leicester Breed.—The Judges of the Short-horn Breed of cattle.

Southdown, Cheviot, and Cross Breeds.—Mr Robertson, East Keeldon, Northumberland; Mr Grieve, Branxholme Park, Roxburghshire.

OF SWINE.

The Judges of the Short-horn Breed of cattle.

OF WOOL.

Mr Pringle of Haddington, and Mr Hadden, Aberdeen.

OF DAIRY PRODUCE.

Mr Forbes of Boyndlie; Mr William Fraser, Aberdeen; Mr William Edwards, Aberdeen; Mr A. Willox, Aberdeenshire.

In the evening the Committee and members of the Society, to the number of 350, dined together in the County Hall, the Earl of Aberdeen in the chair. After dinner the following papers were read. The first was by Mr Walker, " On the rotation of cropping suitable for the three counties more immediately connected with this district." He said—

"The subject which I have the honour of bringing before the present company for discussion this evening, is one of considerable importance both to landlord and tenant. The subject referred to is the rotation of cropping most suitable for the various soils of the three counties more intimately connected with the object of this meeting. Before entering upon the subject of rotations, it will be necessary to give a brief description or classification of the various soils which more generally prevail in this and the adjoining counties. These may be divided into five or six classes, namely—1. The strong heavy clay along the coast, and in some places in the interior. 2. The heavy loam, or alluvial soils. 3. Light loam, comprehending the old infield lands. 4. Gravelly loam, with an open porous subsoil. 5. Thin muirish soil, recumbent on clay, or poor wet clays, having a retentive subsoil. *First*—Strong heavy clay. Along the coast, and in a few places in the interior of the country where the climate is favourable for the growth of beans and other leguminous crops, the rotation generally followed is a six-course shift, viz.—first, grass; second, oats; third, beans and pease; fourth, wheat; fifth, fallow or green crop; sixth, barley, with grass seeds. This, while the price of grain continues high, is perhaps as profitable a course as can be followed; but it must be land of the first quality to continue long under this course of cropping. *Second*—Heavy loams, or alluvial soils. Land of this description is perhaps the best and most valuable in the three counties, and may be managed under any rotation in which land is worked under the present improved system of agriculture. The four-course shift is, upon the whole, to be preferred, viz.—grass, oats, turnips, barley; but in many districts in this country it is not thought expedient, even on the finest soils of this description, to cultivate beans or wheat, as for want of climate these grains seldom come to perfection. *Third*—The third class consists of light loam or old infield. This, provincially, is denominated turnip and grass soil. Experience has now fully proved that the best rotation for land of this quality is a six-course shift, viz.—three years in grass (all depastured by cattle or sheep), one grain crop, after breaking up from grass; then turnips, a proportion of which should be eaten off by sheep, where the climate and situation will permit; and the sixth year barley or oats, sown down with grass seeds. In many places of these counties, land of the quality and description referred to is still worked under a seven-course shift, which differs only from a six in this respect, that two grain crops are taken in succession, after breaking up from lea; but this system cannot be commended, and ought as speedily as possible to be given up, and a six-course substituted. Since the introduction, on so large a scale, of bone-dust as a manure for raising turnips, and the facilities which the farmer now has of disposing of his fat stock, many of the best agriculturists in this district are turning their attention more to the cultivation of grass and turnips; and in place of three years, as suggested in the above rotation, allow their land to lie four or five years in grass, and, when broken up, take only one grain crop, being now fully satisfied that their land will be more easily prepared for the succeeding crop of turnips, and much less risk of a failure in that valuable and important crop. *Fourth*—The fourth class of soils is gravelly loam—what is locally called *sharp* land—suitable for grass and turnips. There is now, I believe, no longer a doubt among the best and most intelligent agriculturists of this district that the six-course shift is the one best adapted for land of this quality—it being always considered beneficial to let the land remain in grass a year or two more, if, by doing so, the rotation is not otherwise disturbed. *Fifth*—The last class named is the poor thin clays. This is, perhaps, the most unpromising and unproductive of all soils. No doubt the introduction of thorough or parallel drains will do much towards the amelioration of these soils; but the expense is often so great, that tenants holding under leases of nineteen years' endurance, are unwilling to embark a large portion of their capital in what appears to them a hazardous enterprise. Without thorough-draining this soil, no particular rotation can be prescribed for it. Under all circumstances, perhaps a five-course might prove the best and most advantageous. In order, therefore, to improve the country, and this description of soil in particular, I feel confident that the landlords of these counties would find it much for their interest to give the greatest encouragement to their tenantry in carrying into effect this system of draining. The question under consideration is one on which difference of opinion may no doubt exist; but that it is a subject of importance all agriculturists must admit."

Mr Boswell of Kingcausie then read a paper "On the increasing desire to combine science with agricultural pursuits." "That there has been, of late years, a great increase in the public mind of the wish to combine science with the practice of agriculture, there cannot be a doubt; nay, that wish is every day growing stronger and stronger; and it is equally true that there is a lamentable destitution as to the means of procuring such knowledge. It is true we have in the country plenty of good practical men, and in the towns there is no lack of men of science; but the combination is very rare. And for a young man to acquire such knowledge is a matter of much difficulty, accompanied with great pecuniary loss, not to speak of valuable time thrown away, by first attending lectures in a town, and then learning the practical part in the country; and even this is not easily managed, at a rate far above the funds at the disposal of the great mass of the people. Now, allow me to endeavour to shew you that the union of science with practice is most desirable, that it is high time to set about procuring the means of such union, and that nothing appears to me to be easier than to put such means within the reach of all who wish to avail themselves of it. I have ever been a great advocate for our grand parochial system; I have ever been for giving the people education, provided it was a sound religious one. Happily, the

Highland Society has long ago formed an amalgam of all political creeds; and I feel assured that no such sentiment, that the people can be over-educated in a proper manner—a sentiment worthy only of the dark ages, is to be found amongst us. It is pleasant to think that, as members of the Highland Society, we stand firm as brethren—like true sons of old Scotia, hand in hand and shoulder to shoulder, for the improvement of agriculture and the good of our native land. But, while we cannot for a moment allow the antiquated doctrine of keeping our agricultural population in a state of ignorance, while we scout the idea of having our farmers as ignorant as serfs, or our peasants no better than Hill Coolies, do not mistake me that I would be a backer of a trumpery system of teaching the lower orders to garble hard words, or to render them objects of ridicule from the continual misnomer of names, the meaning of which they could never be taught fully to comprehend. There is no occasion that men should dive into the mysteries of the French chemists; and yet they may be taught—ay, and with advantage to themselves—that there are such things as alkalies and acids, that the air we breathe is composed of several gases, and that such and such combinations of different matters will produce substances fitted for the food of plants. Again, in botany, it is by no means necessary that our agriculturists should reach the celebrity of a Smith or a Hooker, or that they should waste their time in the contemplation of the cryptogamic flora of our mountain sides. There is no occasion for employing the aid of a solar microscope to teach us that plants which botanists term synganesious have the power, at a certain stage of their existence, of perfecting their seeds after they are cut down, and that the thistle and the common ragweed are amongst the number. And again, need a man be an Archimedes to know all the useful truths of the power of the lever or screw. And that all this knowledge is much required, we need only look at the mistakes that men, practical men, fall into, such as putting rape-cake to a crop where no moisture is likely to make it into a soluble state; while bones are placed in wet situations, where a little chemical knowledge would tell them they could not decompose. Turn to the ignorance of botany. Look to men putting themselves to charges to cut down weeds at a time when they can as well perfect the seeds as if they had not been touched. In mechanics, look at the ill-constructed thrashing-mills, the friction in badly-made axles, and a thousand other things, which a very slight acquaintance with natural philosophy would enable the farmer to put to rights. I should grow tedious did I enumerate all the absurd mistakes I have seen perpetrated through ignorance of the simplest principles of science; and in none more than in the department of botany. We should laugh in common life at any man, or set of men, dealing in any article, and yet not knowing what it was. But what do we see in agriculture? I know many men who pay heavy accounts to Messrs Gibb or Lawson, and yet have not the slightest idea what it is they have bought and paid for. Sometimes seeds are sent from London to the care of a factor or land-steward, to get a fair trial, as it is called. But how can these men give such seeds a fair trial? They read on the ticket which their employer has sent, it may be, crested dogs-tail, or cocksfoot, or Timothy grass; but when it springs they know no more than the man in the moon whether it be dogs-crests or dogs-tails, cocks-feet or hens-feet, Timothy-grass or Anthony-grass. That it is high time to set about procuring the means of information for such as thirst for it, must be self-evident to all. If proof were wanting, it can be had in the daily lament of our young farmers and our grieves of their lack of scientific information. I could not tell how many men have said to me, 'I greatly feel my want of chemistry, my want of botany,' and the like; while numbers have declared their wish to go anywhere, if, at a reasonable rate, they could procure such information. Thus, we see we have arrived at that point of civilization when there is a call for some school, of such sort as may give agriculturists an opportunity of acquiring scientific knowledge. How, then, is this to be managed? I answer, let the Highland Society lend all her influence and her countenance to the establishing an Agricultural College and Experimental Farm! Oh, some will say, there is nothing new in that; the idea of an experimental farm has been often mooted, but it won't answer. I admit it is not new, it has been mooted; but by whom? and how? I know that the subject has been broached by men, high as regards both talent and patriotism, and they have not been listened to; but I will tell you how that has happened. No sooner was the plan brought forward hitherto, than it has been caught up and marred by wild schemers and theorists—men in whom the agricultural world had no confidence—who, forming to themselves the *beau ideal* of an experimental farm, talked of things they knew nothing of, and which could not be carried out in practice. I would have a plain, not a very large farm, say three hundred to four hundred acres, situated in a good locality (perhaps near Montrose or Perth), the buildings to be of the plainest sort—no paid clerks. Fellenberg has long ago shewn us, that at Hofwyl all the work could be done for the instruction to be got within the walls of the institution; and why not in Scotland? I would have the unavoidable expense defrayed by the premium or fees paid by the wealthier class of students, who would not be required to perform manual labour; and, to conclude, I would have it set about quickly, not hung up like a suit in Chancery, to be talked of, but never decided upon; and if it did not support itself after being fairly set agoing, I should advise to sublet (as it is called) the farm, and give up the concern, being certain that there either was 'rottenness in Denmark,' as to the management of the seminary, or that we had deceived ourselves, and that the public wished for nothing of the sort."

Captain Barclay spoke "On Short-horns, and the districts of country in which they were calculated to succeed." He said "That the question proposed was one which was very difficult to reply to; and he thought every farmer ought to be judged in connection with the circumstances, the soil, and the climate, in which he is placed. He had introduced the short-horns into this country in the year 1822; since that time he had cultivated the breed to a considerable extent, and they had fully answered his expectations. He had established sales for cattle, which were attended by many farmers. They felt their way cautiously, and found that crossing the short-horns with other breeds produced a much more valuable stock, which could be brought to market at an earlier age. They found that the sending of such cattle by steam to the London market, was much more profitable than the old system of selling the breed of the country to the English drovers. It was now, he believed, the general opinion of the farmers, that there was no breed so profitable as the cross with the short-horns. They were also found equally hardy with the native breeds of the country, and he had invariably treated them in the same manner, never allowing them to enter a house from one year's end to another, farther than allowing them an open shade in winter."

Mr Leslie, Warthill, then read some remarks "On the progress of Agriculture in the Garioch during the last half century." He said:—"I am inclined to think the few observations in my power will be best understood when confined to the statistics of a single parish. I have therefore selected that of Rayne, as affording a pretty fair specimen of the average soil, climate, and general agricultural management of Aberdeenshire. Contrasting, therefore, the present situation of that parish with the report of it contained in Sir John Sinclair's Statistical Account of Scotland, I find that, in the course of the last forty years, the population has increased about one-fourth, and that, after supporting these additional mouths, the annual exportation of *spare* victuals has advanced from 200 bolls of meal to at least 3000 quarters of grain. According to the same authority, the number of cattle sold off yearly averaged 180, estimated at L.3 a-head, or L.540; whilst *now* not less than L.3000 per annum may be stated as the general average sum derived from that source. Half a century ago, the far greater part of the tillage labour was performed by oxen, ten, and sometimes twelve, being employed in drawing one plough, and, in my own recollection, thirty-three such ploughs existed in the parish. These animals consumed so large a portion of the best of the *keep*, that a comparatively small share remained for cows and young cattle, and, consequently, from three to four cows, and from ten to twelve young cattle, were the usual number kept on a farm, and those starved on dry straw for eight months in the year. Dairy produce, of course, formed no part of the farmer's income; and so scantily supplied were the family wants, that *raw sowens*, under the not inappropriate designation of 'ousen's milk,' was frequently resorted to as a substitute for being eaten with the oatmeal pottage. Now-a-days, however, the produce of the dairy and hen-roost, after amply and comfortably supplying household demands, bring in perhaps one-third of the land rent. The home-bred stots in those days we considered unfit for plough cattle, which were invariably brought in large droves from Angus and Fife shires at the commencement of the ploughing season; and hence were the deficiencies arising from sales and casualties annually made up. Now the steam-shipping companies' books exhibit a very different result, and the number and quality of fat cattle exported from Aberdeenshire to the London markets perhaps equals, if not exceeds, what is sent from any other county in Scotland. About the period before mentioned, instead of being valued per the acre, land was commonly estimated by the *plough*, rather a vague, undefined term in the present day, but which was then understood to comprehend about thirteen bolls sowing of infield, ten folds of three bolls sowing each, and ten faughings of similar extent, in all about seventy-three acres.[*] The infield was kept constantly under grain crops, and had been so from time immemorial, by the application of the whole farm-yard dung to the half of it every second year, on which occasion it was sown with bear or bigg, and, for the intermediate crop, with *white* oats. The folds were manured by means of the cattle and sheep being placed in them to rest during the forenoons and nights of the summer season, for which purpose one of them was annually enclosed with a temporary turf fence. After which treatment, two crops of white oats, two of brocked oats, and one of small corn, were taken in succession. Small flocks of sheep were kept on most farms, and the dung made by them, when housed in winter, constituted the usual allowance of manure for the faughs, which were always ploughed over from the lea the year previous to being cropped, and a second time when the dung was applied before sowing. In some cases, a little powdered lime, carried in sacks on horseback from some of the inland lime quarries, was added, but so sparingly, that it was sprinkled out by the hand; four crops of small corn were then taken in succession, and then both faulds and faughings were left to rest in natural grass for the following five years, when the foregoing rotation was repeated. Turnips and sown grasses were rarely cultivated, and to a small extent; the former, sown broadcast, and yielding a miserable crop, from being ill-cleaned and left too thick on the ground; the latter, when the land had been tolerably limed, produced rich and heavier crops of clover than can now be obtained from the same land in a more improved state. It may not be out of place to remark that, although the produce from land in those days afforded a scanty return, it was, nevertheless, obtained at a very small expense, rents and servants' wages being low, and the farm implements of the simplest and cheapest construction.

Rent of infield, from 13s. 4d. to .	L.0	16	6	per acre.
Folds and faughings, 2s. to . .	0	9	0	...
Ploughman's wages, . . .	L.3	6	8	per annum.
Horseman's do.	3	0	0	...
Second do. and goadman for oxen,	2	15	0	...

---

[*] The *faughings* consisted of what were termed *Burrel rigs*, *i. e.*, ridges separated by *alternate* uncultivated spaces of fully equal extent, termed *Baulks*. Consequently the three bolls sowing of faughs comprehended an extent of surface fully equal to 6 acres; and in its present improved state, the *plough*, of course, will extend over upwards of 103 Scotch acres, or about 129½ imperial.

Herd-boy's wages from 10s. to	L.1 0 0	per annum.
Maid-servant's do., L.1 : 2 : 4,	1 10 0	...

All converted from Scotch money, by which rents and wages were *then* calculated. Wood for a plough, purchased in the timber market of Laurence Fair, at Old Rain, the great emporium for that article, from 3s. 6d. to 5s.; and charge of ploughwright for making it, 8d.—no iron used but for coulter and sock; yokes for oxen, from 8d. to 1s.; bows for do. from 2s. to 5s. per dozen; harness for horses, manufactured from sprots, rushes, and the annual clippings of the horses' tails, prepared for the purpose—it being understood as forming part of a horseman's engagement that he was to furnish a complete set for the horses he wrought, which he had to manufacture during the course of the winter evenings. There were no ploughing matches in those days; but, if the size of the furrow-slice were to determine the quality of the work, the ploughmen of the present times would have no chance in competing with their predecessors in that art; I myself having seen a furrow-slice, turned by a crack ploughman, when he found the land deep enough and the surface sufficiently matted with weeds, of the goodly dimensions of thirty inches broad by twelve deep! There were no cattle shows then; but eight or ten oxen-ploughs, with their long horns and a corresponding length of bows, working alongside each other on one farm, which I and another gentleman here present have ofttimes seen, whilst the *rindrig* system prevailed—if not a *show*—was, at any rate, no rare sight. I may also add, that the veterinary art had made so great progress, that cures were performed nothing short of being miraculous. On one occasion, a poor man's cow was given up as being incurable, when a neighbouring cow-doctor recommended some *live* haddocks being applied *internally*—which, of course, were procured from the fish-town of Whitehills, and five of them gently put over her throat, which had such an effect that, in a few days afterwards, the despaired-of patient was gambolling about with her tail behind her. I may also mention another little anecdote regarding the value of turnips:—In the year 1778, my father, wishing to give his people a treat at *cliack*, or harvest-home, sent a servant on horseback, in charge of two pecks of meal, to the gardener of Tillyilt, near Haddo House, a distance of ten miles, from whence he brought, in exchange, exactly the same number of pecks of turnips, very much resembling oranges in point of size and colour, but the taste of which I still remember, and have seen nothing of the kind half so good since. Some of the foregoing statistics will doubtless appear so very extraordinary, that it may be necessary to observe, in conclusion, that all of them are consistent with my own personal knowledge, with the exception of the cure performed through the instrumentality of the Enzie haddocks."

The sub-committee, for placing the stock on the show-ground, were on the ground by a little after 5 o'clock, A. M., and after much exertion, the whole stock were ready for the inspection of the judges by a little after nine. The judges awarded the following premiums in the respective classes of competition:—

I. CATTLE.

1. *Short-horn Breed.*—For the best Bull, calved after 1st January 1835—Twenty-five Sovereigns—to his Grace the Duke of Buccleuch.

For the second best ditto, of same age—Fifteen Sovereigns—to Mr John Hutchison jun., Monyruy, Aberdeenshire.

To the Breeder of the best Bull in this class—the Honorary Silver Medal—to Mr Raine, Gainsford, Durham.

For the best Bull, calved after 1st January 1839—Ten Sovereigns—to Mr F. Simpson, Mains of Pitfour, Aberdeenshire.

For the second best ditto—Five Sovereigns—to Mr George Robertson, Haughhead, Kincardineshire.

For the best Cow of any age—Ten Sovereigns—to his Grace the Duke of Buccleuch.

For the second best ditto—Seven Sovereigns—to Mr Robert Simpson of Cobairdy, Aberdeenshire.

For the best Heifer, calved after 1st January 1838—Seven Sovereigns—to his Grace the Duke of Buccleuch.

For the best ditto, calved after 1st January 1839—Seven Sovereigns—to Mr John Hutchison jun., Monyruy, Aberdeenshire.

2. *Aberdeenshire Horned Breed.*—For the best Bull, calved after 1st January 1834—Fifteen Sovereigns—to Mr Alexander Keith, Netherthird, Aberdeenshire.

For the second best ditto—Ten Sovereigns—to Mr George Gordon, Bucharn, Huntly, Aberdeenshire.

To Mr Keith, as the Breeder of the best Bull in this class, the Honorary Silver Medal.

For the best Cow, of any age—Ten Sovereigns—to Mr James Pirie, Collithie, Aberdeenshire.

For the second best ditto—Five Sovereigns—to Dr Thomas Thomson, Inverury, Aberdeenshire.

For the best Ox, calved after 1st January 1836—Ten Sovereigns—to Mr William M'Combie, Tillyfour, Aberdeenshire.

For the best Ox, calved after 1st January 1837—Seven Sovereigns—to Mr James Lumsden, Keir, Aberdeenshire.

3. *Aberdeen, Angus, and Galloway Polled Breeds.*—For the best Bull, calved after 1st January 1834—Fifteeen Sovereigns—to Mr Isaac Machray, Torie Farm, Kincardineshire.

For the second best ditto—Ten Sovereigns—to Sir Thomas Burnett, Bart. of Leys, Kincardineshire.

For the third best ditto—Seven Sovereigns—to Mr Robert Hector, Fernyflatt, Kincardineshire.

To Mr Brown, Banchory, as Breeder of the best Bull in this class—the Honorary Silver Medal.

For the best Cow, of any age—Ten Sovereigns—to Mr Duff Dingwall of Brucklay, Aberdeenshire.

For the second best ditto—Seven Sovereigns—also to Mr Dingwall of Brucklay.

For the third best ditto—Five Sovereigns—to his Grace the Duke of Richmond.

For the best Heifer, calved after 1st January 1838—Seven Sovereigns—to his Grace the Duke of Richmond.

For the second best ditto—Five Sovereigns—to Mr James Walker, West Fintray, Aberdeenshire.

For the best Heifer, calved after 1st January 1839—Seven Sovereigns—to Mr Robert Walker, Mains of Portlethen, Kincardineshire.

For the second best ditto—Five Sovereigns—to Mr John Collier, Hatton, Forfarshire.

For the best Ox, calved after 1st January 1836—Ten Sovereigns—to Mr David Welsh of Tillytoghills, Kincardineshire.

For the second best ditto—Five Sovereigns—also to Mr Welsh of Tillytoghills, Kincardineshire.

For the best Ox, calved after 1st January 1837—Seven Sovereigns—to Mr John Garland, Cairnton, Kincardineshire.

For the second best ditto—Three Sovereigns—to Mr James Anderson, Pitcairnqy, Kincardineshire.

4. *West Highland Breed.*—For the best Bull, calved after 1st January 1834—Fifteen Sovereigns—to Mr William Grant of Ruthven, Banffshire.

To the Breeder of the best Bull of this class, to Mr M'Laren, Rannoch—The Honorary Silver Medal.

For the best Cow, of any age—Ten Sovereigns—to Mr William Grant of Ruthven, Banffshire.

In this Class, the Cows exhibited by Mr Grant Duff of Eden, and Mr George Taylor, Aldroughty, Elgin, were commended.

For the best Heifer, calved after the 1st January 1838—Five Sovereigns—to His Grace the Duke of Sutherland.

The animal next in value to this Class belonged to Mr George Taylor, Aldroughty, Elgin.

For the best two Oxen, calved after 1st January 1836—Ten Sovereigns—to Mr Fergusson of Raith, M.P.

For the best two Oxen, calved after 1st January 1837—Seven Sovereigns—to Sir John Muir Mackenzie of Delvin, Bart.

The Judges had the greatest difficulty in deciding between this lot and another, the property of Mr M'Combie, Tillyfour.

5. *Cross Breeds.*—For the best two Oxen, first cross between a Shorthorn Bull and an Aberdeenshire Cow, calved after 1st January 1837—Ten Sovereigns—to His Grace the Duke of Richmond.

For the second best two ditto—Five Sovereigns—to Mr James Walker, Wester Fintray.

For the best two Oxen, same cross, calved after 1st January 1838—Seven Sovereigns—to His Grace the Duke of Richmomd.

For the second best two ditto—Five Sovereigns—to Mr Morrison of Bognie.

For the best two Oxen, calved after 1st January 1836, a cross between a West Highland Bull and Polled Cows—Five Sovereigns—to Mr Peter Brown of Linkwood, Elgin.

For the best two Oxen, of any cross except those specified, calved after the 1st January 1836—Ten Sovereigns—to Sir F. Mackenzie of Gairloch, Bart.

6. *Any Breed.*—For the best Ox, of any breed, calved after 1st January 1836—Ten Sovereigns—to Mr William Hay of Shethin, Aberdeenshire.

For the best Heifer, of any breed, calved after 1st January 1836, shewing fat and weight—Seven Sovereigns—to Mr Arthur Harvey, Tillygreig, Aberdeenshire.

For the second best ditto—Five Sovereigns—to Mr Andrew Longmoor, Rettie, Banffshire.

For the best two Oxen, of the Aberdeenshire Horned or Polled Breeds, calved after 1st January 1836—Ten Sovereigns—to Mr Duff Dingwall, Brucklay.

II. HORSES.

For the best Stallion—Fifty Sovereigns—to Mr Loudon, Cranston, Abington Inn, Lanarkshire.

For the second best ditto—Forty-five Sovereigns—to Mr Robert Bowie, Gelmidland, Stirlingshire.

For the third best ditto—Forty Sovereigns—to Mr Robert Halley, Green of Keillour, Perthshire.

For the fourth best ditto—Thirty-five Sovereigns—to Mr William Hay, Middlethomastown, Stirlingshire.

The stallion exhibited by Mr Mitchell, Balchrystie, Perthshire, was noticed as worthy of commendation.

For the best Breeding Mare for agricultural purposes—Fifteen Sovereigns—to Mr Robert Wilson, Firthfield, Fifeshire.

For the second best ditto—Ten Sovereigns—to Mr Thomas Bowman, Halhill, Lanarkshire.

A mare exhibited by Mr Boswell of Kingcausie was commended.

For the best Filly—Eight Sovereigns—to Mr William Hay, Shethin.

For the second best ditto—Five Sovereigns—to Mr William Hay, Shethin.

III. SHEEP.

1. ***Black-faced Breed.***—For the best Tups lambed after 1st January 1837—Five Sovereigns—to Mr John Falconer, Balnakettle.

For the second best—Three Sovereigns—to Mr James Deans, Mitchellhill, Peebles-shire.

The Judges noticed that all the animals in this class were of great merit.

Blackfaced Ewes.—For the best—Five Sovereigns—to Mr John Collier, Hatton, Forfarshire.

For the second best—Three Sovereigns—to Mr James Fergusson, Ambarrow, Kincardineshire.

For the best Wether of any age—Five Sovereigns—to the Earl of Haddington.

2. *Leicester Breed.*—For the best Tup, lambed after 1st January 1837—Seven Sovereigns—to Mr George Brown, Hall, Haddingtonshire.

For the second best—Three Sovereigns—to Hugh Davidson, Esq. of Cantray.

For the best Leicester Ewe—Five Sovereigns—to Arthur Harvey, Esq. of Tillygreig.

3. *Cheviot Breed.*—For the best Tup, lambed after 1st January 1837—Six Sovereigns—to Messrs Young and Craig, Bighouse, Sutherlandshire.

For the second best—Four Sovereigns—to the same exhibitors.

For the best Ewe of same Breed—Five Sovereigns—also to Messrs Young and Craig.

Another lot exhibited by them was noticed in terms of commendation.

4. *Southdown Breed.*—For the best Tup lambed after 1st January 1837—Five Sovereigns—to his Grace the Duke of Richmond.

A Tup exhibited by Mr Duff Dingwall of Brucklay, commended.

For the best Shearling Tup—Three Sovereigns—to his Grace the Duke of Richmond.

For the best Ewe—Five Sovereigns—to his Grace the Duke of Richmond.

For the best Gimmer—Three Sovereigns—to his Grace the Duke of Richmond.

For the best Wether of any cross or age—Four Sovereigns—to his Grace the Duke of Richmond.

For the best Wether, cross, Leicester Tup and Cheviot Ewe—Four Sovereigns—to Mr Boswell of Kingcausie.

IV. SWINE.

For the best Boar—Five Sovereigns—to his Grace the Duke of Buccleuch.

For the second best—Four Sovereigns—to John Boswell, Esq. of Kingcausie.

For the best Sow—Five Sovereigns—to Mr Thomson, New Inn, Inverury.

For the second best—Four Sovereigns—to Mr William Alves, Aberdeen.

For the best Pigs.—In this class Mr Boswell carried the two premiums of Four and Three Sovereigns.

V. WOOL.

Five Sovereigns for the best Combing Wool were awarded to Mr George Brown of Hall, Haddington.

Samples exhibited by Mr Traill, Ratter, Caithness-shire, noticed as being little inferior to the prize specimens.

The specimens of Wool exhibited by Mr David Skirving, Camptonhead, Haddingtonshire, and Mr Alexander M'Tavish, Inverness-shire, noticed in terms of commendation.

VI. DAIRY PRODUCE.

For the best lot of Cured Butter—Five Sovereigns—to Mrs Duguid, Lochills, Aberdeenshire.

For the second best—Three Sovereigns—to Mrs Ann Macdonald, Easter Thainstone, Kincardineshire.

The Butter exhibited by Mrs J. Reid, Balcairn, and Mr James Walker, Wester Fintray, were commended.

The Judges noticed favourably the Butter made from Whey by Mrs Donald, South Monecht, Aberdeen.

For the best Full Milk Cheese—Five Sovereigns—to Mrs Morison, Blhaggarty.

For the second best—Three Sovereigns—to Mr James Walker, Wester Fintray.

Cheese exhibited by Mrs Gamack, Whitehill, was commended.

For the best Skim-milk Cheese—Five Sovereigns, to Mrs Adamson, Middle Drums, Forfarshire.

For the second best—Three Sovereigns—to Mr James Walker, Wester Fintray.

VII. EXTRA STOCK.

1. Of the class of Cattle in the extra stock, the Judges commended four cross-bred steers, belonging to Mr William Tower, Kinaldie, Aberdeenshire, as possessing great merit, and deserving of a premium. They also commended a short-horn six year-old quey, the property of Mr Robert Hutchison, Middleton of Rora, Aberdeenshire, as possessing merit. Of the West Highland breed, the Judges commended a three-year-old ox, the property of the Duke of Sutherland, as possessing great merit; as also a pair of two-year-old oxen, the property of J. Mackenzie, Esq. junior, of Glack, as beautiful animals. Of the Aberdeenshire Breed, the Judges commended two four-year-old oxen, of great merit, the property of Mr William M'Combie, Tillyfour; and three polled oxen, the property of the Messrs Stephen, Milden, Aberdeenshire, as possessing great merit.

2. Of the class of Sheep, the Judges commended a Southdown wether, the property of the Duke of Richmond, as worthy of notice; and four very good Cheviot gimmers, the property of Mr Brown, Linkwood. The Judges specially noticed a very extraordinary ewe, of the Cheviot breed, five years old, having borne fifteen lambs in four years, exhibited by Mr Thomas Rae, Eastside, Tillygreig.

3. Of the class of Horses, the Judges commended the following animals:—1. A pair of grey draught fillies, four years old, well matched and

useful, the property of Mr William Ronaldson, Tulloch, Kincardineshire. 2. A brown draught brood mare, six years old, the property of Mr George Irvine, Balbridie, Aberdeenshire. 3. A pair of grey draught mares, six years old, well matched, handsome and useful, the property of John Boswell, Esq. of Kingcausie, Kincardineshire. 4. A bay gelding, the property of Mr James Tindal, Veterinary Surgeon, Golspie, upon which a bold and successful operation had been performed by him. In consequence of an external injury the spinous process of one of the bones of the withers having become diseased, he made an incision between the shoulder blades and cut out nearly four inches of the bone; the parts healed up, and the horse afterwards became quite sound, leaving only a hollow about the size of a man's hand in front of the saddle, but which is hid by the wither-lock. In consequence of the difficulty of performing such an operation, the judges recommended a premium to be awarded to Mr Tindal. 5. A bay Cleveland entire colt, the property of Alex. Morrison, Esq. of Bognie, Aberdeenshire, promises to make a useful stallion to cross with clean short-legged mares. 6. A very good specimen of a Shetland pony, the property of Dr Thomas Thomson, Inverury.

VIII. ROOTS AND SEEDS.

Of this class, the Judges in their report noticed the following particulars, viz.:—

1. In the extensive and varied collection of Messrs Lawson and Son, 102 varieties of wheat, 30 of barley, and 42 of oats, in grain and straw, 100 varieties of potatoes, and a very full assortment of cultivated grasses, forage, herbage, and other useful plants, of which the following, from their recent introduction, may be particularly noticed:—

The Chilham and Hopeton Wheats, the former reputed early, and well calculated to resist damp.

New Early Siberian Oat, a remarkably early variety, imported from Germany last spring.

Giant many-stalked Russian Rye, a very hardy, strong growing, and remarkably prolific variety.

Alopecurus Nigricans, a very early, hardy, and strong-growing species of Foxtail grass from Siberia.

Milium Effusum, Scotch Wood-Millet, stated to be productive as an early spring grass, and valuable from yielding an abundance of seeds, which afford excellent food for game.

Melelotus Leucantha Major, or Bockhara Clover, growing from twelve to fourteen feet in height, yielding abundance of food for cattle.

Hopeton Tare, a remarkably strong-growing and prolific variety of summer tare, with white flowers, raised by the originator of the Hopeton oats and wheat.

Laing's Purple-top Swedish Turnip, a distinct hardy variety, and very late in running to seed in spring.

Tripsacum Dactyloides, or Gama Grass, from the southern coasts of North America.

2. Very fine specimens of Whittington wheat, weighing 64 lb. per bushel; Potato oats, 47¾ lb.; Sandy oats, 47 lb.; Chevalier and Cambridge barley; and also specimens of the purple-top Swedish turnip, grown on the home farm of his Grace the Duke of Richmond at Gordon Castle.

3. Perennial Ryegrass Seed, weighing 30¼ lb. per bushel; and also fifty-eight specimens of clover-grass and turnip seeds, from Mr David Roughead, Haddington.

4 Mangel Wurzel Roots, fine specimens of Carrot, especially the white Altringham; very good specimens of Onions; also a large collection of Pines, amongst which were particularly noticed a variety of Pinus Sylvestris, named Cœrulea, from Mr James Roy, Aberdeen.

5. Fine Perennial Ryegrass Seed, weighing 28 lb. per bushel, from Mr James Pirie, Collithie, near Huntly.

6. Specimens of Potatoes, crop 1839, in a high state of preservation, from Mr John Leslie, Huntly.

7. Specimens of two varieties of Cattle Potatoes, recommended to cultivators in late districts, on account of their early character and productiveness, from Dr Farquharson, Alford.

8. Specimen of Seedling Potato, exhibited as a hardy and healthy variety, from Mr John Barnet, Mains of Philorth, near Fraserburgh.

9. Specimens of three varieties of Potatoes, from Sir Francis Mackenzie, Bart. of Gairloch, with an account of their weight, shewing the variety under the name of Wellington, as the most suitable in his district of Ross-shire.

10. Also, from Sir Francis Mackenzie, Bart., specimens of seven varieties of wheat, sown for experiment in November last, with an interesting account of the produce.

11. A specimen of Hopeton Oats, eight feet in length, of which a field, the soil a sandy loam, was grown by Sir Neil Menzies.

12. In this department there was also exhibited a very fine specimen of very fine ground Bone-dust, manufactured in Sweden, from Mr Ballingall, Kingsdale, in Fifeshire, who states that twelve bushels produces the same effect as twenty of that which he has been accustomed to use.

13. The judges noticed a collection of specimens of wheat, classified with the number of grains of wheat in a scruple, Apothecaries' weight, of each variety, indicating their form, colour, and size, which Colonel Le Couteur of Jersey exhibited as a model for a general and uniform system of classification, and which would answer for any kind of grain.

IX. IMPLEMENTS.

The Judges of this class recommended premiums to be awarded to the following contributors, viz:—

1. To Mr John Peter Skene, Tough, for a Winnowing Machine.

2. To Mr William Armstrong, for application of a Folding Mould-board to Mr Smith of Deanston's Subsoil Plough; and to Mr John Mackinlay, Overseer at Deanston, for an improved Yoke-chain, exhibited by the Messrs Drummond of Stirling.
3. To Mr Alexander Nicol, Goldy, in Forfarshire, for a model of a machine for Sowing Turnips and Bone-dust.
4. To Mr John Chapman, for his mode of adjustment of the Handle of the Short Scythe.

The Judges also commended the following articles:—

1. Gardener's Patent Turnip-Cutter.
2. Mr Cleland's Catch for holding Bulls.
3. Mr Macdonald's Iron Plough with apparatus for sowing Bone-manure.
4. Mr Lindrum's Instrument for ploughing old lea.
5. Mr Neill's good workmanship of his implements, and especially for a Cart, on an improved principle, for adjusting the load.
6. Mr Sampson's Improved Turnip-Hoe, and simple machine for Washing Clothes.
7. Mr H. S. Smith's model of a Hollow Brick Wall, used for a simple application of the principle of heating by hot water.
8. Mr Stromach's model of a Snow Plough.
9. Mr Buist's specimen of Wire Gates, manufactured by Mr Douglas, Cupar-Fife.
10. A Drain-Plough, by Mr Macewen, Stirlingshire.
11. Captain Hay of Belton's patent Right and Left Plough, made by Messrs Slight and Company, Edinburgh, excited attention.

Amongst the articles exhibited which attracted attention were beautiful specimens of the Wool of the Alpacha, and of Cloth manufactured therefrom, by Mr Danson, Liverpool; specimens of pure Saxony Merino Wool, and crosses with the Merino and Cheviot Sheep, were exhibited by Robert S. Graham, Esq. of Kilcaldrun, Forfarshire; and also specimens of Anglo-Merino Wool, taken from the sheep's back after three years' growth, were sent for exhibition by Lord Western.

The sale of the stock which carried off prizes on Thursday, took place in the show-yard on Friday morning. It flagged rather heavily for some time; but, on the whole, fair prices were obtained.

It was generally remarked that the quality of the animals exhibited were good, and their condition betokened the care that had been bestowed on them by their owners; of the horses, in particular, there never was a show at which they were so uniformly good. There were very few sheep exhibited—arising, no doubt, from the circumstance of few sheep being raised in the part of the country embraced within the bounds of the show. The pigs were not numerous either, but the cattle and horses were both numerous and important. From the variety of cross-bred cattle shewn, it was evident that the short-horn blood is spreading in that part of the country; and the specimens of fat evince that the cross improves the quality and weight of the native breeds. One remarkable feature of this show was the presence of Hereford cattle, both as breeders and fat cross-bred stock; and, from the circumstance of this cross preserving the character of the horn of the horned Aberdeenshire cattle, it is not unlikely that Herefords may become favourites with the breeders of that particular kind of Aberdeenshire cattle.

The great dinner after the show went well off in a pavilion erected by Mr Machray, innkeeper, for the occasion, in which 1500 were accommodated. The President of the Society, his Grace of Sutherland, was in the chair, supported by the Duke of Richmond, Marquis of Tweeddale, Earl of Aberdeen, Viscount Arburthnot, and a great number of gentry from many parts of the country. The Rev. Mr Grant of Leith officiated as chaplain to the Society, for the first time since his appointment as successor to the late excellent Principal Baird. Many of the noblemen and gentlemen gave plenty of game for the table, and the Duke of Sutherland desired fine pine apples to be sent all the way from Trentham Hall in Staffordshire.

THE AGRICULTURIST'S NOTE-BOOK.—NO. XIII.

Potato Failure, By Mr James Falconer, Balnakettle, Kincardineshire.—The partial failure of the potato crop in this quarter has again excited a good deal of interest among agriculturists. This malady, if such it may be called, is but of recent origin here. Within the last four years, however, it has twice made its appearance, namely, in 1838 and during the present season; but previous to that it was very little known in this county. Several causes have been assigned for it, and some apparently with a good deal of plausibility; but still it appears in some measure involved in mystery, or, in other words, not in every instance satisfactorily accounted for. Conceiving it, therefore, a duty incumbent on those practically concerned with the cultivation of that valuable esculent to make such facts as come under their notice generally known, I shall, in conformity with this impression, describe a few particulars relating to it which have this season come under my observation.

It occurs to me, and I find the same opinion is held by many others, that the predominant cause of failure this year was owing to the unusual heat and drought which prevailed at the time of planting, as most failures occurred in those fields which were planted about the latter end of April and beginning of May, at which time the drought was greatest, and but comparatively few where planting was performed a fortnight or so earlier, or where delayed until showers began to fall. The failures upon the whole, however, are not so great as at one time was expected, but still there are but few instances of fields planted at the period above mentioned without less or more blanks in them, and some at least one-half deficient. In order to ascertain the difference between fresh and well rotted dung in raising potatoes, I last year, about the middle of November, carted out forty loads of farm-yard dung, and piled it up in a dry, well-sheltered situation, to the depth of about three and a half feet. The carts were drawn over it, and when finished it was closely covered with good mould, and remained in that state during the winter. In the second week of April, it was carefully turned over, the lumps well divided, and the heap thrown up to the depth of four and a half feet, or thereby. An increased fermentation soon took place, and when removed to the field, which was on the 1st and 2d May, it was sufficiently well rotted for either potatoes or turnips. This was applied to one end of the field, and went over about two and a half imperial acres; and the other end, measuring about the same extent, was manured with fresh, but tolerably moist dung from the farm-yard, at the rate of about seventeen good loads per acre. Both were spread, the seed planted, and the drills reversed as expeditiously as possible; but as the field was of considerable length (from seventeen to eighteen chains), the fresh dung was a good deal dried before the process was completed. By the term fresh dung is meant unfermented farm-yard manure, composed of straw and the excrement of cattle, horses, and pigs, thrown promiscuously together, and containing as much liquid matter as to promote its decomposition in the soil. About two-thirds of the field, which was composed of a light, dry, open-bottomed soil (twice ploughed in April, and otherwise well prepared), were planted with cut, and the rest with uncut sets from the varieties called dons, white Americans, and Perthshire reds, and part of each was kept in an out-house, and part pitted in the field during the winter. All three were a fine crop last season, and fully ripened. When the planting was finished, the drills were gone over with a turnip-sowing machine, a plan I invariably adopt in dry weather, both for the purpose of causing the land retain the moisture, and also for preventing the crows getting such easy access to the young plants from the sides of the drills. Owing to the uncommon dryness of the ground, the plants were somewhat longer than usual in making their appearance, and it soon became evident that a number of the cut sets had failed, particularly where the fresh dung had been applied. I examined a good many blanks, and found the sets uniformly the same in all, namely, of a brown snuff colour when broke, and most of them without any appearance of having germinated. Several, however, were found partly sound, and a number of these, which happened to have an eye in the sound part, had sent forth a shoot from three to four inches long, with a small tuber about the size of a pea on the point of it, but which, so far as I could discover, never came above ground. The plants from the uncut sets, on both ends of the field, came up more vigorously than those from the cut ones; and by the end of July the difference between the fermented and fresh dung was scarcely perceptible, both shewing a much greater flush of stems than the rest of the field, which continued rather unequal and puny throughout the season. Neither of the kinds, however, produced the usual quantity of blossom or plums; but the tubers are generally dry and palatable, though inferior in point of size to last year. I may mention that the cut sets were from the middling and largest sized potatoes, and, unless the largest of the sets, two eyes were allowed to each of them. The uncut sets, with the exception of some of the largest tubers, which were thrown aside, were taken promiscuously from the heap, the smallest size planted at about the same distance from each other as the cut ones, namely, from six to eight inches, and the largest from twelve to fourteen. One would naturally have supposed, from he appearance of the stems, that the uncut sets would have yielded by far the heaviest return; but such is not the case. To be sure, the potatoes after these are most numerous, but they are generally of smaller size, and not so equally ripened; so that, making some allowance for the blanks among the rest, the produce as to quantity is much the same,—say nearly thirty bolls, of 40 stones each, per imperial acre.

Such is the result of the foregoing experiment, from which it may be inferred that well rotted manure is much preferable to unfermented for ensuring a braird in dry weather, but that the plants, after having reached a certain stage, thrive nearly as well with the latter, and even, I incline to think, from the commencement in a moist season; though, for my own part, I must say that I am partial to mixed well fermented manure for every species of green crop. I have repeatedly used both kinds for growing potatoes, but not hitherto as a comparative trial on the same field. I forgot to say, that a few of my potato drills were manured this season with a compost of peat-ashes, the refuse of the kitchen, and a mixture of pig's dung; and that, though part of the seed was fresh cut, and part cut nearly a fortnight prior to being planted, there did not appear a single failure, and if any difference, the crop was fully as early ripened, the tubers as numerous at the stems, and generally of good size. I may farther add, that one of my ploughmen, who came here at Whitsunday, had a few pecks of cut seed of his own planted on the fermented dung, of which nearly one-half failed.

I stated in my last paper on this subject that practical farmers were much divided in opinion as to the proper time the potato sets should be cut previous to being planted. A good many insist that the wound or cut ought to be allowed time to dry or gather a crust, while several, on the other hand, approve of newly cut sets as the surest and quickest growers. I have often tried both ways, and may farther add, that scarcely a season elapses without part of my potato sets being planted immediately after being cut, and part cut from a week to a fortnight beforehand, and from what I have uniformly observed, the fresh cut generally take the start. Where large fields are to be planted, it is considered by many as indispensable to commence with the cutting of the seed a week or two previous to planting; but this, I incline to think, is mistaken economy, and could easily be obviated by employing a few additional hands at that time, which would add but little to the expense, while it would prevent the risk of the sets heating, which they are very apt to do at that season when large quantities are thrown together, and which, I am fully convinced, after long experience, is very injurious to the vegetative principle of the seed. The sets, too, in this case, are often much wasted by allowing them to send forth large shoots, which are almost always rubbed off in the planting, and succeeded by others less vigorous. Potatoes are also liable to be less or more heated, and sometimes frosted, when stored in wet weather such as last year, and immediately covered up; but this is often unavoidable, unless where there is a large accommodation of house room, so as to allow them to be frequently turned and dried. The only alternative in cases of this kind is to put but few of them together. The common way is to store them in oblong pits, which answer quite well when the tubers are clean and dry, but small round ones are perhaps preferable under different circumstances, from being kept more cool by a freer admission of the circumambient air. Whether round or oblong, they ought on no account to exceed from five to six feet in breadth when the potatoes are wet and earthy.

Allow me in conclusion to observe, that, from what I have seen and heard in regard to potato failures, or *taint*, as they are usually termed, I am induced to think that it owes its origin more to local or adventitious circumstances than any inherent aptitude to disease in the vital organs of the plant; but this I by no means assert as matter of fact, but merely as my own individual opinion.

Destruction of Sparrows.—We hear much of the necessity which more than ever exists for destroying sparrows; and have lately read, in several periodicals, lamentations over the devastation they cause to the crops of the farmer; and appeals to parish officers beseeching them to grant their aid to effect an extermination of the marauders, by inciting the youths of their districts to catch them and bring their offending heads to be paid for at so much per dozen.

We used to deem with Pope, that "whatever is, is right," and firmly believed that He who made the wheat and the sparrows knew best how to portion production to consumption; and, *vice versa*, the consumers to the produce. We were accustomed to consider it just, that, out of the fulness of the farmers' barns, the birds, which at one season devoured those grubs and caterpillars that would have destroyed his crops, merited their daily rations of grain from the garnered stores which they had assisted to save. We loved to reflect that all living,—ay, even ungrateful men—were created to be happy, and liked to watch the wanton freaks and saucy peckings of these very calumniated birds, in that blessed mood which the sight of joy inspires.

In an evil hour for all this equanimity, we took to keeping fowls—more sparrows than chickens in the farm-yard, was the consequence; barley for twenty-four, instead of twelve little beaks, was required. That proverbial and rather agreeable boldness for which the sparrow has been always celebrated was magnified, and became insufferable insolence; coveys, flocks, flights of the neighbouring "chartered libertines," were invited by the resident *eaves-droppers* to regale upon our purchased barley. "Five shillings a bushel was too much to give for food to pauper, rascally sparrows." What should we do to destroy them? They were not worth powder,—traps they were too cunning to enter,—cats were too well fed to seek for such "small deer." The nuisance must be abated; what must be done? Poison was suggested, and to poison we resorted. Nux vomica was purchased, a portion boiled, and a handful of wheat steeped in the fatal liquid. On the following morning it was scattered, and in half an hour the deadly effects were seen: in every direction lay the offending causes of our ire; cats grew corpulent upon the easily-obtained supply, and our vengeance, after a few weeks slaughter, was appeased.

Having last year lost gallons of summer fruits, particularly currants, from the attacks of birds, we this summer scattered the poisoned wheat among the currant bushes; gave the cat her milk every day in a fresh spot near the laden trees, and rejoiced in the supposed success of our scheme. But, about the time when the currants and gooseberries began to turn colour, a new evil appeared; myriads of caterpillars, green and black-marked ugly things, covered every leaf of almost every tree; whole bushes were stripped of their leaves in the course of a few hours, and the immatured fruit turned sour and withered upon the naked boughs.

Hand-picking was resorted to, lime, sulphur, tobacco, &c. were dusted ineffectually over the creatures; hot-water was administered with a powerful syringe—every method was tried to subdue the plague,—and in vain! There stood the ghastly trees on the 30th of August, bare as December!

The "poetical justice" of the thing is *now* clearly apparent to us. We destroyed the sparrows that had kept our garden free from caterpillars, and which sparrows had never eaten the fruit; while the soft-billed birds—chaffinches, white-throats, thrushes, &c.—that could not eat the poisoned corn, have despoiled the trees of their fruit, as they had done in past seasons. Too late we recollected that we had read an account from Germany, two or three years ago, which stated that a whole district was laid waste by caterpillars after it had been cleared from sparrows, because they had taken too large a proportion of the farmers' corn.

We are aware that our statement appears too strongly to urge the claims of ravenous sparrows to be permitted to live out their natural lives, and feast, unharmed, upon the labour of man. And we are not quite satisfied that we are right to do so; for not only are they among the living creatures that were made to be taken and destroyed, but they undoubtedly consume a great proportion of corn. It appears, then, that it is a matter for calculation and of speculation, for the farmer to decide, whether on his land the denizen sparrows should live or die. To the gardener we think them decidedly useful.

Draining of Fens.—An extremely important and interesting experiment was witnessed by a great number of professional gentlemen and persons connected with the Fens, and the indisputably successful result excited the highest satisfaction. Salter's Lode, where the experiment was made, is two miles from Downham Market. An engine has been erected here, and arrangements were made for adapting the Hydraulic Belt to the engine. The belt is composed of a woollen material, passing over two cylinders of wood at a certain distance from each other. Any number of belts may be employed, according to the body of water to be raised. By the mere velocity of the belt a sufficient power is produced to raise the water and throw it over the top cylinder. For the purpose of the experiment, the engine was made to employ about three-horse power; and with this extent of force more than 800 gallons of water was raised per minute, at a lift of about twelve feet. The superiority of the belt over the ordinary mill was sufficiently attested by the comparison the spectators were enabled to make by the keeper of a wind-engine hard by setting it in motion. This mill was of twenty-five horse power, and at the time of the commencement of its operations had the advantage of the water running off by the belt raising the water to its level; yet the greatest lift did not exceed two feet; nevertheless it raised no more water than the belt work, as before mentioned, by the engine of three-horse power. In the opinion of the engineer, the additional outlay of but L.75 would serve to raise 2500 gallons of water per minute, instead of 800 gallons.

QUARTERLY AGRICULTURAL REPORT.

23*d November* 1840.

Our anticipations of the crop which has just been secured in the barn-yard have been very nearly realized; still it is below expectation. The grain is all of good quality, weighs heavy, and there is prospect of a large yield; still it is not just what its bulky appearance in the ground promised. The winter wheat is of good quality and heavy, some of it having been presented in the Edinburgh market as much as 66 lb. per bushel, and the general run may be taken above 60 lb. The spring wheat, on the other hand, cannot be so good or heavy; we have not heard of any of it being yet thrashed; but as it was late in ripening, we may be sure that it will neither be so full or heavy or well coloured as the winter-sown, and as there was a large breadth of spring-sown in the last crop, owing to the excessive falls of rain preventing the fallow and potato land being sown in due time, and not until spring, the quantity of the spring-sown cannot fail to have some effect on the market when it makes its appearance. We cannot help regret at seeing so much *white* wheat sown in Scotland, whose climate in general seems unsuited to bring the more delicate white varieties to perfection. In favoured spots the thing may be done with impunity, but we are convinced that farmers, in most parts of the country, stand in their own light by sowing white instead of red wheat. The red not only yields plenty of straw, but will be fuller, thinner skinned, and of course heavier than white in *most* seasons and situations in the country. There is a notion abroad among farmers that bakers dont like *red* wheat, and wont buy it. This is just a foolish prejudice on the part of the bakers which the farmers should by no means encourage. There is not the least doubt of red wheat making a most beautiful flour, giving a large return, and rising strongly in the dough. Confectioners may reasonably prefer white to red wheat, for the kind of paste which they make must be delicately white, and a soft flour answers that purpose the best, but the flour of red wheat makes a strong rising loaf, and sweet and nutritious bread. As an inducement otherwise to raise red wheat, we may state that, with the same treatment as white, it will yield from six to eight bushels more per acre; and as to yield of flour, we have known red creeping wheat weigh twenty-seven stones per boll of six bushels, which yielded twenty-four stones of first flour, and that in a fine season of as fine a quality as that of fine white wheat. Red wheat generally taking a longer time to come to maturity than white may be objected to for spring sowing; but the Lammas red is a kind which soon undergoes all the process of vegetation, yields well, and makes a very good spring wheat. The barley is generally a bulky crop, yielding well, and proving heavy in fine land, some as much as 56 lb. per bushel; but the weaker barley soils are not yielding to the appearance of bulk, and not exceeding 53 lb. in weight. The oats are a very bulky crop every where, and will yield well, not excepting the higher districts, though of course the latest potatoes will be inferior in quality. The lateness of the oat crop in being cut may be accounted for this year from the circumstance that much of the seed did not braird in the dry weather in spring when they were sown, and its brairding having taken place only after the fall of rain, two crops of different ages proceeded on the same ground *pari passu*, and the last was waited on until it ripened. There was a great risk in thus waiting in shaking the riper portions, which would invariably have been the case had windy weather ensued; but the season throughout was so agreeable, and fair, and trustworthy, that much confidence was placed in its sincere-like character. Some early and isolated developments of hoar-frost affected the crops in some of the glens of the Highland mountains, and we fear that wind may have played some mischief with the latest portions obliged to stand out longer than wished on account of the rain. The potatoes have taken up a bulky crop in some places, and in others not so; so that on the whole the crop is not so bulky as it is fine in quality, which is the principal consideration with this crop, for much waste is attendant on a waxy state of this esculent. We mentioned the existence of the failure in our last remarks, and have no doubt that it was that malady which has caused a deficiency of bulk anywhere. We find the failures ascribed to the very dry state of the ground when the crop was planted in spring. No doubt the drought was the proximate cause of the failure, but we never can think on this malady, and hear the circumstances attending it, but are more convinced that its primary cause lies in the delicate nature assumed by the tubers by too long a propagation by their means solely. We think this is a safe view to take of the subject, at all events it is one which will set the farmers a-thinking on it, and the botanical physiologists experimenting on it, and there must be something very wrong with the plant, if both or either do not find out a remedy. The turnip-crop is very good in general, though the bulbs have not enlarged to the size which the luxuriant state of the foliage indicated. We have a theory for this. It is allowed that the month of October is the period for the turnip increasing most largely in the bulb. Now, it may have been observed, that the temperature throughout all October was very moderate, seldom rising above 56° in the warmest part of the day, though never falling below 40° in the night. This monotonous or torpid state of temperature is unfavourable to vegetation,—plants may survive but cannot increase in it. Still there is a great bulk of excellent food for stock on the land, and, so far as the season has as yet gone, its consumption has been attended with pleasant weather,—and this is a matter of no mean consideration in the feeding of stock, particularly of sheep on turnips.—The great markets of both the Trysts at Falkirk, as well as at All-Hallow Fair, were supplied with great numbers of cattle and sheep, which met with a ready demand at high prices. The Trysts were particularly high; and, though the prices at Hallow Fair were inclined to give way, that arose more from the nature of the stock being under the Falkirk mark, than any actual depreciation of the market price of stock. There seems a great drain of stock towards England, where the turnips are good. Good-conditioned stock is not so scarce as fat, which still realizes 7d. per pound in towns. Fine-bred stock of all kinds realize high prices, and are really scarce. Smithfield prices are from 4d. to 6d. a stone of 8 lb. more than last year at this date.

The grain markets will now continue to be well supplied; and the barley in particular may be expected to be readily bought up by the distillers and maltsters, who have done very little business for the last twelve months. The importation of foreign wheat has gradually increased during the quarter from under 400,000 to above 500,000 quarters the month; and the quantity entered for home consumption has also increased from 166,255 quarters on the 5th August, to 1,305,541 quarters on 5th October, notwithstanding the increase of duty from 2s. 8d. on the 8th August to 21s. 8d. on 9th October. This state of affairs has had the effect of almost emptying the bonded warehouses, which had in them on 5th August 905,544 quarters of wheat, but now only contain 60,556. This is a pretty strong proof that the speculators expect a fall in the price. Indeed prices have gradually fallen from 28th August, when wheat was at 72s. 3d. a quarter to 62s. 1d. on the 13th November. And, above all these symptoms of increased plenty this year over the last, the wheat on the 15th Nov. 1839 was 67s. 4d. per quarter, and the difference in the price of barley is still greater, that having been 41s. 4d. at the last-mentioned date, whereas it is only now 34s. 9d. a quarter. Notwithstanding these droppings in the price, the better crop, and the price of the mainspring of agricultural prosperity, that of stock, continuing high, the prospects of the farmer this year are much better now than at this period last year.

We are sorry to observe the actual visit of the epidemic among stock to our borders, and some cases have occurred as far north as the neighbourhood of Edinburgh. This epidemic fortunately is not fatal to life if properly administered to in time. In cattle it begins with symptoms of dulness and loathing of food, and then a slavering at the mouth; then a blistering of the mouth and nose, and tenderness and breaking out at the feet, even to the loss of hooves. In sheep it cannot be so easily noticed at first, as disease in them generally proceeds some length before alarming symptoms are exhibited. Their feet, however, become tender, and then they go on their knees to eat. A friend of ours in Berwickshire tells us that he has had 55 cattle, and upwards of 200 sheep affected. He was on the outlook for the disease, and "fore-warned being fore-armed," he got the mastery of it in the course of a fortnight, having lost only four sheep, which, he thinks, were choked by improper administration of the medicine, and not killed by the disease. His cure was, on observing the first symptoms of dulness and loss of appetite, to administer 1 lb. of epsom salts, 1 ounce saltpetre, and ½ ounce of powdered ginger in a quart of gruel to every grown up beast, and which served five sheep. He bathed the feet with a solution of sulphate of copper in water, the *blue* vitriol of the shops, 1 ounce to a quart of water, three or four times a-day. Some of the beasts and sheep got the drink for several days, whilst others were completely cured in one or two days. As the first symptoms ought to be attended to, it would be well for farmers who have stock to provide themselves with the proper medicines, and keep a strict look out; but should the symptoms become aggravated under their hands, a skilful veterinary surgeon ought to be immediately sent for.

THE REVENUE.

***ABSTRACT** of the Nett Produce of the Revenue of Great Britain, in the Quarters and Years ended on the* 10*th of* October 1839, *and* 10*th of* October 1840,—*shewing the Increase and Decrease on each head thereof.*

	Quarters ended Oct. 10.		Increase.	Decrease.	Years ended Oct. 10.		Increase.	Decrease.
	1839.	1840.			1839.	1840.		
	£	£	£	£	£	£	£	£
Customs, ...	5,778,106	5,662,877	. .	115,129	19,915,296	20,152,739	237,448	. .
Excise, ...	4,113,150	3,916,249	. .	196,910	12,152,171	11,958,467	. .	166,704
Stamps, ...	1,699,724	1,751,417	51,693	. .	6,508,523	6,726,317	217,794	. .
Taxes, ...	311,283	332,807	21,524	. .	3,713,784	3,744,372	30,588	. .
Post-Office, ..	407,000	123,000	. .	284,000	1,533,000	694,000	. .	839,000
Miscellaneous,	57,654	69,382	11,728	. .	263,907	251,794	. .	12,113
	12,366,926	11,855,932	84,945	596,039	44,086,681	43,527,689	485,825	1,017,817
	Deduct Increase,			84,945	Deduct Increase,			485,825
	Decrease on the Qr.			511,094	Decrease on Year,			581,992

TABLES OF PRICES, &c.

The Average Prices of the different kinds of GRAIN, per Imperial Quarter, sold at the following Markets:—

LONDON.

Date.		Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1840.		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Aug.	7.	80 4	31 7	30 3	37 6	46 6	44 4
	14.	78 5	31 9	30 2	38 8	48 0	47 8
	21.	78 10	34 9	30 3	40 2	47 6	47 6
	28.	79 6	33 4	32 8	39 4	46 6	47 0
Sept.	4.	74 7	32 8	32 10	38 6	45 8	47 5
	11.	68 8	32 3	30 10	38 2	44 6	46 6
	18.	68 1	35 6	28 1	37 8	44 0	45 11
	25.	66 1	35 8	26 10	37 6	43 2	45 8
Oct.	2.	68 8	34 1	27 5	36 4	42 8	45 5
	9.	64 4	40 6	25 4	35 6	43 4	42 0
	16.	66 9	40 6	25 8	35 10	43 6	43 11
	23.	66 2	38 11	24 8	36 6	44 0	43 2
	30.	65 4	38 7	24 2	37 6	48 4	44 0

DUBLIN.

Date.		Wheat per Bar. 20 St.	Barley per Bar. 16 St.	Bear per Bar. 17 St.	Oats per Bar. 14 St.	Flour per Bar. 9 St.
1840.		s. d.	s. d.	s. d.	s. d.	s. d.
Aug.	4.	31 3	16 10	13 6	18 2	23 7½
	11.	36 5	17 6	13 5	16 0	23 8½
	18.	36 7	18 6	12 5	16 7	23 4½
	25.	35 6	17 4	12 7	16 5	23 9½
Sept.	1.	32 5	16 8	12 1	16 9	23 2
	8.	30 3	15 2	11 5	15 7	23 8
	15.	29 5	14 6	10 4	12 9	23 0
	22.	29 6	14 3	10 6	10 9	23 6
	29.	29 3	14 6	10 6	11 7	23 7
Oct.	6.	29 10	15 5	11 3	10 2	22 0
	13.	29 0	14 7	10 6	10 3	22 2
	20.	31 2	14 6	10 9	10 7	21 7
	27.	31 6	14 8	10 9	10 8	21 2

LIVERPOOL.

Date.		Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1840.		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Aug.	7.	72 2	28 6	28 1	36 6	46 8	49 8
	14.	70 7	28 10	28 6	37 2	47 6	47 9
	21.	69 10	29 6	28 5	38 6	48 4	47 3
	28.	72 11	28 6	26 9	39 2	49 0	48 8
Sept.	4.	68 9	28 4	27 3	38 4	48 6	49 0
	11.	62 5	28 10	26 4	38 0	47 2	48 3
	18.	56 8	30 4	24 11	37 8	46 0	48 10
	25.	61 8	31 2	23 8	38 4	45 4	50 4
Oct.	2.	64 7	32 9	23 4	37 6	44 2	48 3
	9.	63 4	31 11	22 1	37 2	42 1	47 10
	16.	61 9	31 6	22 7	36 6	43 6	48 8
	23.	61 5	32 8	21 7	35 8	42 6	50 0
	30.	57 9	36 8	20 0	36 4	42 0	48 0

EDINBURGH.

Date.		Wheat.	Barley.	Oats.	Pease.	Beans.
1840.		s. d.	s. d.	s. d.	s. d.	s. d.
Aug.	5.	72 0	37 6	36 7	47 0	47 8
	12.	69 2	35 8	35 6	46 9	47 6
	19.	69 6	35 6	34 7	46 6	47 2
	26.	70 0	34 0	31 6	46 2	47 0
Sept.	2.	70 6	34 2	30 0	47 6	48 2
	9.	70 0	32 6	30 6	48 0	48 6
	16.	72 0	33 6	29 6	47 4	48 0
	23.	68 0	34 0	28 6	47 6	48 2
	30.	68 6	33 1	27 10	47 4	48 1
Oct.	7.	66 0	32 10	24 6	46 8	47 2
	14.	67 8	34 5	24 8	46 0	46 10
	21.	68 8	34 6	26 9	46 8	47 2
	28.	67 0	33 0	27 6	46 6	47 0

TABLE shewing the Weekly Average Prices of GRAIN, made up in terms of 7th and 8th Geo. IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIGN CORN; the Duties payable thereon, from August to November 1840.

Date.		Wheat.			Barley.			Oats.			Rye.			Pease.			Beans.		
		Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.
1840.		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Aug	7.	72 10	70 4	10 8	33 0	34 4	10 10	30 0	28 9	4 9	37 3	36 0	15 6	45 11	45 5	2 0	47 0	46 0	1 0
	14.	72 4	71 1	6 8	32 4	33 5	12 4	30 5	29 2	3 3	40 0	36 10	15 6	44 8	45 6	2 0	46 11	46 3	1 0
	21.	72 7	71 9	6 8	33 4	33 2	12 4	30 6	29 7	3 3	38 11	37 5	14 0	43 7	45 4	2 0	47 0	46 6	1 0
	28.	72 4	72 3	2 8	34 11	33 4	12 4	30 7	30 0	1 9	39 5	38 0	12 6	45 4	45 2	2 0	47 5	46 9	1 0
Sept	4.	68 11	71 10	6 8	34 8	33 8	12 4	30 6	30 3	1 9	38 6	38 4	12 6	44 5	45 0	2 0	47 3	46 11	1 0
	11.	65 4	70 8	10 8	35 3	33 11	12 4	28 7	30 1	1 9	39 8	39 0	11 0	44 2	44 8	3 6	47 0	47 11	1 0
	18.	64 2	69 3	13 8	36 8	34 6	10 10	25 10	29 5	3 3	39 8	39 4	11 0	42 6	44 1	3 6	45 6	46 10	1 0
	25.	64 1	67 11	18 8	36 2	35 2	9 4	24 10	28 6	4 9	37 7	39 0	11 0	42 7	43 9	5 0	45 3	46 7	1 0
Oct	2.	64 7	66 7	20 8	36 0	35 7	9 4	25 1	27 7	6 3	35 5	38 5	12 6	43 5	43 9	5 0	45 7	46 4	1 0
	9.	64 0	65 2	21 8	36 5	35 10	9 4	23 9	26 5	7 9	35 9	37 9	14 0	42 10	43 4	5 0	44 2	45 9	2 0
	16.	63 3	64 0	22 8	36 5	36 2	7 10	23 8	25 4	9 3	37 3	37 7	14 0	43 5	43 2	5 0	44 11	45 4	2 0
	23.	62 5	63 9	23 8	36 1	36 3	7 10	23 1	24 5	10 9	36 11	37 1	14 0	43 3	43 0	5 0	39 11	44 10	3 6
	30.	61 7	63 4	23 8	35 3	36 1	7 10	22 5	23 10	12 3	37 1	36 7	15 6	43 0	43 1	5 0	44 10	44 8	3 6

The MONTHLY RETURNS, published in terms of 9th Geo. IV. c. 60, shewing the Quantities of Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantities upon which duties have been paid for home-consumption, during the same Month; and the Quantities remaining in Warehouse at the close thereof, from 5th August 1840 to 5th October 1840.

Month ending	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
Aug. 5. 1840.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu	Qrs. Bu
Wheat, . .	206,198 0	2 0	206,200 0	2,724 0	2 0	2,726 0	720,953 0	118 0	721,071 0
Barley, . .	41,599 4	. .	41,599 4	24,215 3	. .	24,215 3	26,126 2	. .	26,126 2
Oats, . . .	123,934 2	. .	123,934 2	107,044 1	. .	107,044 1	96,577 3	. .	96,577 3
Rye, ...	601 2	. .	601 2	85 2	. .	85 2	3,861 5	. .	3,861 5
Pease, . . .	12,266 4	121 1	12,387 5	7,578 0	121 1	7,699 1	33,375 0	. .	33,375 0
Beans, . .	11,775 1	57 2	11,832 3	24,609 0	57 2	24,666 2	24,651 2	. .	24,651 2
Totals,	396,374 5	180 3	396,555 0	166,255 6	180 3	166,436 1	905,544 4	118 0	905,662 4
Sept. 5.									
Wheat, . .	292,965 1	975 1	293,940 2	361,481 0	975 1	362,456 1	640,222 0	2,678 0	642,900 0
Barley, . .	14,731 2	. .	14,731 2	1,557 5	. .	1,557 5	37,844 4	. .	37,844 4
Oats, . . .	142,095 5	. .	142,095 5	122,810 1	. .	122,810 1	111.277 4	. .	111,277 4
Rye, ...	58 6	. .	58 6	30 1	. .	30 1	3,806 4	. .	3,806 4
Pease, . . .	19,565 6	1,077 5	20,643 3	30,596 3	1,077 5	31,674 0	25,690 0	. .	25,690 0
Beans, . . .	15,059 2	. .	15,059 2	38,412 2	. .	38,412 2	3,131 2	. .	3,131 2
Totals,	484,475 6	2,052 6	486,528 4	554,887 4	2,052 6	556,940 2	821,971 6	2,678 0	824,649 6
Oct. 5.									
Wheat, . .	881,143 1	12 6	881,155 7	1,035,814 5	12 6	1,035,827 3	7,160 1	118 0	7,278 1
Barley, . .	11,049 2	. .	11,049 2	949 6	. .	949 6	46,956 2	. .	46,956 2
Oats, . . .	120,150 4	. .	120,150 4	231,777 1	. .	231,777 1	1,839 4	. .	1,839 4
Rye, ...	750 6	. .	750 6	1,231 6	. .	1,231 6	3,325 4	. .	3,325 4
Pease, . . .	5,198 3	173 4	5,371 7	25,975 2	173 4	26,148 6	584 6	. .	584 6
Beans, . .	9,791 6	. .	9,791 6	9,792 7	. .	9,792 7	690 6	. .	690 6
Totals,	528,083 6	186 2	528,270 0	1,305,541 3	186 2	1,305,727 5	60,556 7	118 0	60,674 7
Aug. 5. 1840	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Flour, . . .	117,918 2 22	69,865 1 13	187,784 0 17	7,844 3 25	69,710 1 5	77,555 1 2	226,671 1 23	218 0 13	226,889 2 8
Oatmeal, .	45 2 16	1,074 1 9	1,119 3 25	. .	1,074 1 9	1,074 1 9	22 1 2	. .	22 1 2
Totals,	117,964 1 10	70,939 2 22	188,904 0 14	7,844 3 25	70,784 2 14	78,629 2 11	226,693 2 25	218 0 13	226,911 3 10
Sept. 5.									
Flour, . . .	65,531 2 1	58,089 0 4	123,611 2 5	178,641 2 8	58,519 3 14	237,161 1 22	100,687 0 13	15 1 14	100,702 1 27
Oatmeal, .	460 1 22	1,205 0 27	1,665 2 21	460 1 22	908 0 14	1,368 2 8	13 0 0	. .	13 0 0
Totals,	65,991 3 23	59,294 1 3	125,276 0 26	179,102 0 2	59,428 0 0	238,530 0 2	100,700 0 13	15 1 14	100,715 1 27
Oct. 5.									
Flour, . . .	176,671 2 25	93,146 3 25	269,818 2 22	272,991 2 1	92,815 3 6	365,807 1 7	8,500 0 9	94 0 8	8,594 0 17
Oatmeal, .	309 2 17	898 0 14	1,207 3 3	302 0 9	898 0 14	1,200 0 23	20 2 8	. .	20 2 8
Totals,	176,981 1 14	94,045 0 11	271,026 1 25	273,293 2 10	93,713 3 20	367,007 2 2	8,520 2 17	94 0 8	8,614 2 25

PRICES of BUTCHER-MEAT.

	SMITHFIELD, *Per Stone of* 14 lb.		MORPETH, *Per Stone of* 14 lb.		EDINBURGH, *Per Stone of* 14 lb.		GLASGOW, *Per Stone of* 14 lb.	
Date.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
1840.								
Aug	7/6 to 8/	7/ to 8/	7/3 to 7/9	7/ to 7/6	6/9 to 7/6	6/6 to 7/6	7/ to 7/9	7/3 to 7/9
Sept	7/6 8/3	7/3 7/9	7/6 7/9	7/3 7/9	7/ 7/9	6/9 7/9	7/3 7/9	7/6 7/9
Oct	7/9 8/6	7/6 8/	7/6 8/	7/6 8/	7/6 8/	7/3 7/9	7/6 7/9	7/6 8/

PRICES of English and Scotch WOOL.

English, per 14 lb.

Merino, ...	23/ to	25/
In Grease, ...	18/	21/
South Down, ...	20/	22/
Leicester, Hogg, ...	15/6	20/
Ewe and Hogg, . . .	12/	15/
Locks, ...	7/6	8/6
Moor, . . .	6/6	7/6

Scotch, per 14 lb.

Leicester, Hogg, . . .	15/6 to	19/6
Ewe and Hogg, ...	12/6	16/
Cheviot, white, ...	14/	16/
Laid, washed, ...	8/6	12/6
Unwashed, . . .	6/6	8/6
Moor, white, ...	4/6	6/6
Laid, washed, ...	3/6	5/6
Unwashed .	3/	4/

THE

QUARTERLY

JOURNAL OF AGRICULTURE.

THE IRON TRADE, CHIEFLY AS CONNECTED WITH SCOTLAND.

By The Rev. **William Patrick**, Hamilton.

Were the luscious and fanciful poet Ovid to return to earth, and have his eyes opened to revel once more on the fair face of nature, and on the present condition of society, particularly in the more civilized and leading states of Europe; were he to penetrate into England (as no doubt he would), and to visit her manufactories, her workshops, and the arcana of her dingy, lurid, Tartarus-looking mining districts, where the smoke and flame for ever ascend, and the sound of the hammer for ever clangs with a masculine vigour, loud as the deadly vengeance which Jupiter of old hurled against the brazen bucklers of the invading giants, his whole ideas would be sadly warped, and his finely-woven poetical conceptions no doubt curiously constrained or metamorphosed; or if his thoughts were at all to fall back upon ancient times and former musings, he would of course be inclined to conclude that he had at length fallen in with an embodyment of his idea of the "iron age," and, by a little farther acquaintance with the agents employed, he would also find that

——"Stubborn as the metal are the men."

How different from his "golden-age"-men would he find these "men of iron!" The poet's sunny fancy had conjured up to him a *spectre* time, when

——"Saturn flourished in an age of gold
On earth: nor mortals yet had heard the alarms
Of trumpets, nor the sputtering of the steel
On anvils formed and hammered into swords."

This same child of song, who chants in visionary strains—

> "How happy lived mankind in Saturn's days!
> Ere tiresome journeys marked our tedious ways,"

would have his Saturnian musings sorely vexed and paralysed by a railway train, or a plashing, puffing steamer passing him like the wind, with some hundreds or thousands of "iron-age"-men tugged along with the speed almost of Jupiter's fabled thunderbolt itself; and no less would the astonishment of such a visitant prove, were he told that even ships from trees—

> "That long-rooted on mountains stood,"

were no longer exclusively destined to "bound over the deep unpractised flood," but that the vile ore, the "horrid iron"

> "Which next to hell the prudent gods had laid,"

contrived and moulded by the art of man, might now be seen skipping the briny waves like a young dolphin, and wafting men and their stores, with the speed of a charioteer at the Olympic games, to the "uttermost parts of the earth." The despised Britons, who were formerly at the very "antipodes" of civilization, and among the most barbarous of barbarians, no longer contented that the earth should yield

> "Her annual income to the crooked share,"

have contrived to render her bowels, or what is *in viscera terræ*, not less fruitful than her surface. With singular sagacity they have explored regions beyond the range of touch or sight, and have literally riddled the earth's surface, where there was only a prospect of their object—the "precious ore." The operations of the mole are directed by instinct, and an appetite for the food which its subterranean caverns unfold. They, like the worms on which they feed, and like some other animals, are miners by nature, and with them the art is not taught or acquired, but is born with them—"grows with their growth, and strengthens with their strength." The "loves of the moles," so ingeniously brought to light by M. Henri le Court, and so philosophically disposed of by Geoffroy St Hilaire, have also something to do with the ingenious researches of these creatures in their subterraneous wanderings. They are, therefore, miners for pleasure, from appetite and necessity, and have the tools for their work ready made by nature. When we look to man, however, we look to another principle—*gain*. Moles are animals who live in a sort of "golden age;" but not quite, for they, like man, have imbrued their hands (paws very like hands) in the blood of their victims. But man, in this iron age, works not merely for food, but for profit, for gain, for

> "Nocens ferrum, ferroque nocentius aurum."

These, and such like speculations, may seem extraneous, if not worse; but, before pronouncing upon them, may we not draw some useful hints as to the connection that subsists between the interests of sentient beings, and the effects or reaction of these upon their physical exertions or moral qualities? To compare small things with great, the "loves of the moles," like the amazing and stupendous exertions of man, of a similar nature, but on a different scale, are not merely "not without interest," but partake somewhat of the poetical and sublime. Sir Walter Scott used to say that if he were to transfer to canvass an idea of a battle scene, he would have a dense cloud of smoke, with an arm appearing here, a leg there, a head and shoulders in another place; or, in a word, he would give but a glimpse of the horrid scene, and leave the rest to imagination. This was his idea of the sublime—the foundation of which is obscurity, allowing a little to the senses, but more to imagination. If obscurity and sublimity be therefore in any way connected, the miner and the mole are the sublimest of all animals, because in their operations the most obscure; and this obscurity alone invests them with an interest which leaves, as in Sir Walter's battle piece, much to the imagination and little to the senses. But let it not be supposed that the interest alone consists in the obscurity, and that the withdrawing of the veil will destroy the charm. The operators themselves are most interesting. In the humbler artist, the mole, we have a beautiful example of a mechanical series of actions, excited by stimuli which are imperceptible to any eye but that of Him who ordained all things. The curious map which M. Henri has given of mole engineering is not less interesting than some of the best executed sections of our most celebrated mining engineers. Without pick or mattock, or the knowledge of the compass, we see this clever little creature penetrating into almost all sorts of soils, excavating galleries with many branches, connecting together many canals, enlarging others, and forming common routes, and although commencing each time at a different place, taking care always to return to the main track. When all those perforations are finished, and carefully formed into a combined system, and brought to perfection, the encampment of the mole is complete. But these effects, however wonderful, or even inexplicable to our common reason or unaided observation, are not incomprehensible, and may be resolved into organization alone, where the essence of the mystery obviously lies; and that organization, depending not on the volition of the animal, and requiring no education, is of course natural, necessary for the support and continuation of being as well as the gratification of appetite, and can be performed at any time, as well in the first year of pairing (moles never *mine* till they pair) as at any after period of life.

Ovid, who was in some respects a fundamental reasoner as well as a poet, gives a less favourable view of men's motives in their mining propensities, and views them as the first corrupters of society:

> ——" cursed steel, and more accursed gold,
> Gave mischief birth, and made that mischief bold."

May we not suppose that the same element, which at once gave birth to the mischief and made it bold, in a more advanced state of society may, in the hands of Providence, be the antidote, the check, or even the instrument for working out the destruction of the very evils of which it was itself the author? By the extension of the means of communication, and by affording a material for embodying the appliances of war, it may be the cause of bringing these ultimately to such a state of murderous activity and perfection as to render the waging of wars impossible, and, at the same time, by bringing men's homes and men's interests, as it were, into a focus, and by contracting space in time, render wars unfashionable—for men's real interests any thing but desirable. Certainly the gigantic efforts of men in the present age in their mining exertions, even depriving them of the benefit of the excuse of the no less expert though inferior orders of creation, are such as to gratify our pride as a species, or to speak to our senses and harmless pride, to render the " genus homo" vain of their exploits, of their versatile powers, of their indomitable perseverance, and almost miraculous appliances of art to nature. Swift's sentiment, although intended as burlesque, here applies in earnest—

> "Nature must give way to art."

It appears not a little singular to those altogether uninitiated in the art, how men should ever have discovered the metals at all, particularly iron, which is seldom or never found in a native state, but under the appearance of an unsightly and useless stone. But with this stone miracles (at least human miracles) have been wrought. From it we have the living magnet, the weapon of war, and nearly all the tools of use in our manufactures. It may in fact be said to be the soul of this "iron age," and to be every way more valuable than gold —the purchaser of gold itself.

To the general reader a description of this valuable metal, its various sorts, the principal fields in which it occurs, the various modes of working it, especially the marked but not generally understood discoveries of modern times, which are the chief cause of the present pre-eminence of the iron trade, cannot but prove interesting, more especially to the agriculturist, with whose pursuits and possessions it is so completely identified, that it may be said to be part of the soil itself.

This valuable metal is almost always found connected with other substances, with which it is intimately combined, forming an ore. In a native state it is extremely rare. In the Philosophical Magazine (xiii. 32), Cramer mentions a specimen found in the mine of Hackenburgh weighing about four pounds; and Mr Kirwan thinks it has also been detected at Eibenstock in Sweden, and in the mountains of Grand Gilbert in Dauphiny. The masses found in Siberia and South America are generally supposed to have been depositions from meteors, and are distinguished from native iron by containing nickel. Iron-ore is one of the most abundant products of nature, exists in every formation, and, as Dr Thomson justly observes, "assumes the most different and even opposite shapes." It is not our intention to describe these at length; but a few hints on the most valuable or interesting species or varieties may serve to elucidate what follows. Iron, when extracted, is very hard, tenacious, and elastic, exceedingly malleable, ductile, sonorous, attracted by the magnet, and itself convertible into the magnet, having a specific gravity of about 7.778. When dissolved in sulphuric acid, mixed with potass, it precipitates a green powder, and produces with prussic acid a rich azure blue. When mixed with vegetable astringents, it gives the acids an astringent taste and a black colour. This most valuable and useful of all metals is a continual attendant on man in all his states of social existence, and has been truly described as giving to the labourer and mechanic his tools, to the soldier his arms, to the sailor his compass, and to the scholar his pen-knife and ink. Native iron has already been described; the following sorts also occur.

1. Meteoric iron, found at Wold-cottage, Yorkshire,—in Scotland, and in various parts of the Continent, and in America and Siberia. These singular meteors seem to fall from the heavens, accompanied with a loud explosion and a hissing noise. They vary in size and weight from a few ounces to several tons. The outer surface is covered with a rough and indented thin black crust, as if burned internally; they are of an ash-grey colour, intermixed with small yellow shining particles. The specific gravity is from 3.352 to 4.281. The meteor of Wold-cottage, according to Howard, contained, in 150 parts, silica 75, magnesia 37, oxide of iron 48, oxide of nickel 2, leaving an excess of 12 from the absorption of oxygen during the operation. These stones, when they fall from the atmosphere, are said to be hot.

2. Chalybeum, found at the base of the mountain Urdjeemski, in Siberia, and in the mines of Sweden. It is the *ferrum compactissimum* of Linnæus, and is so hard as to strike fire with steel, and becomes malleable with fusion. The best kind of steel is made from it. The ore contains a little sulphur, and yields from 50 to 60 per cent. of iron.

3. Magnetic iron-ore, or *ferrum solidescens* of Linnæus, is of a very finely granular texture, and is attracted by the magnet. It is black, with a black streak, is found in most of the iron-mines of Europe and America, and yields a considerable portion of iron. There is another species, *ferrum nigrans et molle*, found in most countries containing iron-mines, subject to many varieties. It also contains sulphur.

4. Magnetic ironstone, or *ferrum tesselare* of Linnæus, is black, with a black streak, in form of crystals. The primitive form of the crystals is regularly 8-sided or cubical, or in 6-sided prisms, terminated by three quadrangular faces. The specific gravity is from 4.200 to 4.939. This ore is found in Britain, Norway, Sweden, Germany, Corsica, and in various other countries. It is attracted by the magnet.

5. Magnetic sand. This occurs imbedded in basalt and wacke, and in the sand of rivers, and on the sea-shores of various countries, and also at the base of volcanic mountains in Italy. The grains are small, angular, and roundish, in octahedral crystals, and seem to be the fragments of other ores washed down and comminuted by torrents and the waves of the sea. The specific gravity is 4.600, and, according to Berzelius, the constituents in 100 parts are, protoxide of iron 31, peroxide of iron 69.

6. There is also a hepatic ironstone found in the Alps of Lapland, liver brown, with a black streak, striking fire with steel, and reducible to somewhat cubical fragments. Another sort, black and compact, with a red streak, reducible to cubic shining fragments, and hence termed nitens, is found in the mines of Arendal in Norway. Another species or variety, called by the great Swedish naturalist *rhombecum*, compact, with a red streak, reducible to rhombic fragments, is found in the mines of Bitshurgen in Sweden; also, a black compact ore, with a red streak, breaking into indeterminate fragments, is common in Sweden. The lamellated ore, as its name indicates, is lamellar, black, with a red streak, and contains a large proportion of iron. These varieties are regarded as such by Schmeister, Cronstad, and others. Some of them contain a large proportion of iron.

7. Magnet or loadstone. This species, so useful to the mariner, contains a great deal of iron, 60 or 70 per cent. It is generally iron-black, brown, steel-grey, or bluish, and is found in the north of Europe, Bohemia, and Peru, in masses, plates, grains, or 8-sided crystals. Of magnetic iron-ores there are also many other varieties; namely, a granular ore resembling the loadstone, except in texture; a fibrous magnetic ore, opaque, soft, brittle, giving a dark-bluish streak,

and consisting of fine, straight fascicled fibres; and a black magnetic iron, in 4-sided pyramids, or 4-sided oblique-angled prisms, or 6-sided wedge-like figures.

8. Columnar iron-ore occurs in Bohemia and other countries. It is brownish-red, formed of slender columns, adhering to each other, and generally incurved. It effervesces with borax, and gives it an olive-green and blackish tinge.

9. Brown scaly iron-ore occurs in Cornwall, Wales, Scotland, and in many places on the Continent. It is of a shiny lamellar texture, with brittle foliations. The specific gravity is from 4.580 to 5.070.

10. Specular iron-ore is internally specular, of a steel-grey colour and lustre, with a red streak. There are several varieties. It is found in Lancashire, in the Isle of Elba, and various places in Europe.

11. Red scaly iron-ore. This substance is scarce. The colour is between cherry and brownish-red; it is soft and brittle, unctuous to the touch, and soils the fingers when handled. It occurs in Germany, Hungary, and Britain. It is sometimes called iron-froth.

12. Black iron-ore. This sort is hardish, fibrous, opaque, with a red or yellow streak, and is not magnetic. It occurs in Scotland, England, Russia, and Siberia. The surface is often variegated with shrub-like ramifications. Its forms are very various.

13. Compact red iron-ore. Compact, opaque, with a red or yellow streak, and, like the former, not magnetic. It occurs in various localities, is soft, and stains the fingers. The specific gravity is about 3.503.

14. Sparry iron-ore. This is a lamellar substance, soft and easily scraped with a knife, and is soluble with some effervescence in acids. It contains some carbonate of lime and magnesia.

15. Red ochre. This is a sort of iron-ore, not magnetic, friable, and without lustre; there are also an argillaceous iron-ore and a blue iron-ore. Bog iron-ore occurs in various places in low swampy situations, or in the form of the well-known eagle-stone. There is also a green iron-earth, arseniates of

iron, bituminous iron, and sulphuret of iron or pyrites, which, in slates, is called diamonds.

These varieties are mentioned more to gratify curiosity, and to shew the multiplied and varied wealth of Nature even in her inner recesses and most recondite operations, than to serve any good which could possibly result from a dry abstract enumeration of names of species or varieties, with brief hints at their most prominent properties and qualities. Besides, few of these are actually staple ware in the iron trade. It is to the carbonate of this useful metal, or what is known by the name of common clay iron-stone, or, scientifically speaking, lithoid, that our manufactures and the arts are chiefly under such numerous and varied obligations. This valuable ore, the true wealth of nations, and the right hand of civilization, is an humble enough mineral in its native state. It is generally found in extensive beds, or in balls, in the carboniferous groups, alternating with coal, lime, free-stone, and slate-clay. The red iron-stone is also a very common ore, especially in Lancashire,—and in that no less important district, the cradle of the infant science of geology, the German mines, where the miner's perseverance, and Werner's ingenuity and research, restored the chaos of nature to order and form, and lit up another lamp in the temple of science, the trimming and guardianship of which at present occupies the united energies of some of the most resplendent and imposing intellects of Europe. Such is the versatile and peculiar character of the human mind, that genius may even be enkindled at the shrine of a worthless stone; and in the dark and desolate, and confused bowels of the earth, man's ethereal intellect may with certainty detect the working hand of Him

> "Who smoothed the rough-cast moon's imperfect mould,
> And combed her beamy locks with sacred gold."

The lithoid or common clay ironstone varies as much in colour and appearance as in richness or quality, or, chemically considered, in its constituents as a sub-species. In many instances it affects a colour approaching light yellowish-grey, inclining to ash-grey, from which it passes into bluish-grey, and also into yellowish, reddish, and clove brown, and brownish-red. The light varieties change their colour on exposure, become yellowish, then brown, and at last black. In Lanarkshire the blackness is so conspicuous, that the best sort is called the " black band of ironstone." It varies in shape, and some sorts have shells. The lustre internally is dull, the fracture earthy, or sometimes flat, conchoidal, or even. The specific gravity is from 2.936 to 3.471. In its contents, speaking very generally, lithoid may contain a *third* of oxide of iron, mixed up with oxide of manganese, silica, alumina, magnesia, carbonic acid, water, and sulphur, in various proportions; silica, alumina, and carbonic acid, forming the chief ingredients. Hæmatites, or red hæmatites, which assumes all the varied forms of stalactites, reniform balls, &c., is also a very rich ore, being composed almost entirely of peroxide of iron, with various but more minute proportions of the same substances as above. Micaceous iron is also chiefly composed of peroxide, with some phosphate of lime. Iron-sand consists chiefly of oxide of iron, with a proportion of the oxides of titanium and arsenic. A sub-species of hydrate of iron, named by Hoffman stilpnosiderite, is also chiefly composed of oxide of iron, with some oxide of manganese. The other varieties containing oxides are, umber and sparry ironstone, as in common clay ironstone, but in larger quantity.

The chief source from whence our mineral wealth is derived is from the carboniferous groups, or great coal-fields, which in Scotland lie in a narrow belt between Dumbarton and St Andrews, and between Ayr and Dunbar. Messrs Philips and Conybeare, in their well-known work the Geology of England, divide the coal-beds of that country into three groups, to which we may add the Scottish beds as a fourth group. These last, notwithstanding the geographical limits stated as above, are in reality scattered over Clackmannanshire, the Lothians, Lanarkshire, Stirlingshire, Perthshire, Renfrewshire, Ayrshire, Dumfriesshire, and Sutherlandshire; but the three principal deposits are those of Glasgow, Dalkeith, and Clackmannan. In England, the different deposits form bands running from north-east to south-west, the beds dipping south-east. Near London, the deposits being mostly very recent, and all secondary or tertiary, it is supposed that different groups of carbonaceous matter may exist to the north and west of that city. Of the three groups of Philips and Conybeare, the first, or that of the north of England, comprehends all the coal-beds to the north of the rivers Trent and Mersey, onwards to the Scottish border. These deposits are connected with a range of transition hills running from north to south, from the confines of Scotland to the middle of Derbyshire, and lying on all sides except the north. They do not form a continued chain, but a series of detached basins, most of them of considerable extent. Of these, seven only require to be more especially noticed:—

1. The great deposit in the counties of Northumberland and Durham, known by the name of the Newcastle coal-field.
2. Several minor coal-basins in the north of Yorkshire.
3. The grand depot in the south of Yorkshire, and in the counties of Nottingham and Derby.
4. The basin in the north of Staffordshire.
5. The great basin of Manchester and south of Lancashire.
6. The basin in the north of Lancashire.
7. The Whitehaven basin.

There exist, besides, some traces of coal at Ashborne, at the foot of Cross-fell.

The second group in England comprehends three basins, and may be termed the central coal-field:—

1. That on the confines of Leicestershire and Staffordshire.
2. That of Warwickshire.
3. That of the south of Staffordshire, or of Derby, and west of Birmingham.

The third group comprises the coal-fields which dispose themselves around the transition formations of Wales. They are divided into three sub-groups:—

1. The north-west basins, including those of Anglesey and Flintshire.
2. To the west of Shropshire, comprehending the coal-basin of Shrewsbury Plain, and those of Colebrook-dale, Cleo-hills, and Billingsley.
3. And finally, the basins to the south-west, including the important fields of South Wales, of Monmouthshire, the south of Gloucestershire, and of Somersetshire.

There are also various basins in the interior of Anglesey, and in Ireland, not properly explored.

The fourth, or Scotch group, may be reduced to three principal basins, those of Clackmannan, Glasgow, and Dalkeith. Some others, although of minor importance, as far as iron is concerned, will also be alluded to.

Mr Bald, well known as a successful and able mineral surveyor, is the great luminary of the Clackmannanshire coal-field. This carboniferous section is situated on the north-west boundary of the great coal-field of Scotland. Its northern boundary extends from near St Andrews, passes a few miles south of Kinross, skirts the Ochils in Clackmannanshire, passes westward of Craigforth beyond Stirling Castle, and thence by the Campsie Fells to the Clyde near Dumbarton. The main coal-field of Clackmannanshire consists of three subordinate coal-beds, formed by two great slips or dislocations of the strata. From pitting and boring the depth is ascertained to be 703 feet, with not fewer than 142 beds or distinctly alternating strata. Unlike other coal-fields, the strata in the main sections contain neither greenstone, limestone, nor trap rocks. The strata contain numerous varieties of sandstone, slate, clay, bituminous shale, indurated clay or fire-clay, and clay-ironstone. It may be observed as a general rule, that the immediate stratum or pavement on which the beds of coal rest is almost, without exception, a greyish-black rock or fire-clay, used for fire-bricks, varying in thickness from the tenth of an inch to several fathoms, and above lime always very thick, in which case it abounds with the remains of the vegetable kingdom, and with figurate balls of ironstone. The ironstone is not very plentiful, yet abundant enough to supply the Devon Ironworks.

The small field of Stirlingshire commences between the town of Dumbarton and the valley of Drymen, and extends east and north-east over a space of twenty-two miles, with a variable breadth. In its centre it is about ten miles broad, but diminishes towards its eastern and western extremities. The form of this basin is elliptical. The interior of the basin is occupied by plies of limestone, connected with a thick formation of trap. The trap is uppermost, and assumes a considerable altitude in the Campsie fells. The coal is mostly of a poor quality and sulphureous. The ironstone assumes two separate forms. In the one the beds are small or thin, from 4 to 14 inches thick, separated by layers of a blue tenacious clay. The other assumes the form of lenticular reniform balls in the blue-clay or schist near the coal, disposed in regular beds of balls, resting on their smooth surfaces, and almost always in regular lines, and seldom so near as to touch. The balls in the same line are usually the same in size, the heaviest at the bottom. They vary in size, from a foot in diameter to half an inch. The ball-ironstone produces a larger quantity of iron than that which is in regular beds, and also a metal of superior quality.

The Glasgow coal-field is about twenty miles in length, and varies in breadth. The same seams of coal, and, generally speaking, of the accompanying minerals, are found in the collieries at Glasgow on the west, and in the Gariongill and Dalserf pits on the east. Messrs Grieve and Taylor, in their "Mineral Report" (page 2), suppose that its shape formerly, if it had one, "must have been elliptical; for at the west end the coals wheel round at Strathbungo, a mile west of Glasgow; and, at the east end, they wheel as fairly round about at Dalserf." Mr Rennie, in his Report (22d October 1798), adopts a similar view, founding his opinion chiefly on the Report of Grieve and Taylor. Sir Henry Steuart, however, was of a different opinion, and holds at a discount the "imaginary ellipsis and sudden wheels of Messrs Grieve and Taylor." According to his account, the coal-field stretches "along the banks of the Clyde, the Alcuith and the Auchter (he might have added the Avon and Calders), and some other smaller rivulets intersecting the intermediate country; that it forms a triangular figure, of the isosceles kind, about twenty or twenty-two miles in length, of which Glasgow is the vertex: and a line drawn from the Clyde, near the village of Carluke, south-east to about Polkemmet, is the base; and that the veins of coal, as well as of other minerals, although, for the most part, they are found to dip or incline towards the Clyde, yet they sometimes also increase in richness, and diminish in extent, in proportion as they approach or recede from the beds of the above-mentioned rivers." The Wishaw and Coltness Railway now penetrates nearly in the same direction, and through the same coal-fields that Sir Henry proposed for the Glasgow and Edinburgh Canal, and unquestionably this is by far the richest mineral district through which a public thoroughfare between the two cities could have been projected. In all these estimates, however, the lower coal, or that at the very bottom of the limestone series, and near the old red sandstone, in the parishes of Carmichael and Douglas, have been entirely overlooked. Taking these with the upper coal-series above the limestone, and with the coals intermingled with the lime, the coal-field of Lanarkshire is one of the richest in the island. There are ten principal seams of coal above the lime, 35 feet in thickness, and about 153 feet deep; and at the bottom of the lime-series ten seams also, 48 feet thick, and about 149 fathoms deep, giving in all 83 feet of coal, to which we may add 10 feet of workable coal for the seams in the upper plies of the lime, as at Lesmahagow and Wilsonton, which will give beds of 93 feet of workable coal in Lanarkshire, besides nearly 50 workable seams. The iron lies chiefly among the upper coal, and near to those best fitted in their qualities for smelting it. Sometimes it is found in regular beds alternating with limestone, abounding with *productus*, *spirifer*, and *euomphalus*. The best black-band, the right hand of the iron-trade in the west of Scotland, lies below the splint-coal. The sections of ironstone and other minerals seen on the Calder near Crossbasket, afford peculiar facilities for studying the connections between the different members of the Glasgow coal-fields; and M. Dufrenoy is of opinion, that the " coal-fields which form the mineral wealth of Glasgow, are above the principal seams of iron." Ball-ironstone also abounds in the Glasgow field, and is disseminated throughout the entire depth of the coal-fields, especially in the schists which accompany the coal-beds. There is a general belief that the ball-iron is of superior quality, especially that which occurs in the neighbourhood of lime. In many of the iron-works they mix the ball with the stratified ironstone, the proportions varying according to circumstances. The Blantyre coal and lime deposits, with the accompanying iron, present several features in common with those found at Alston Moor in Cumberland, from whence it is presumed that the coal-field of Glasgow belongs to the lowermost of the carboniferous groups. The regularity of the beds of iron here, and in other places in Scotland, forms a striking and important feature in these deposits. The same thing occurs, indeed, in Wales, but upon a very small scale, and with much less uniformity. In other coal-fields the ironstone is mostly in balls. These valuable mineral stores may be regarded as the first promoters of canals and railways, with which Lanarkshire is more plentifully intersected than any other district in Scotland.

The Dalkeith basin, near Edinburgh, contains as much coal, but less ironstone, than the fields of Stirling, Clackmannan, or Glasgow. The blaze of furnaces is chiefly confined to the west. This field is also remarkable for a total absence, or comparatively small development, of that dangerous accessary to the mining trade, hydrogen or inflammable gas, an advantage grievously counterbalanced by a more than usual abundance of carbonic acid or choke-damp. The coal in the Dalkeith field is so abundant, that Mr Bald has calculated that it would supply the consumption of Edinburgh alone for 500 years, at the rate of 350,000 tons per annum. In this calculation Mr Bald has included the deeper coals which have not yet been wrought; but there can scarcely be a doubt that when the upper coals are wrought out, human skill, united with human wants and human intrepidity, will, when necessary, reach the "grim ore" which now,

> ———"useless like the miser's brighter hoard
> When from its prison brought, and sent abroad,
> Cheers the frozen hours, and ministers
> To needful sustenance, and polished arts,—
> Hence are the hungry fed, the naked clothed,
> The wintry damps dispelled; and social mirth
> Exults and glows before the blazing hearth."

As the chief object of the author is to give a *vidimus* of the iron-trade in all its branches, especially in the west of Scotland, and to clothe his attempt in language somewhat of a readable and encouraging form, he will perhaps be excused for having accomplished in this paper only a very brief outline of the iron, coal, and lime deposits in Scotland. The subject would not be complete, however, nor would we be fully prepared for the inquiries which follow, were we not to take along with the above a short but comprehensive glance at the coalfields in England also; but we will leave that branch of inquiry for another paper. Lanarkshire being the centre or focus of the iron-trade in Scotland, and the cradle of the new improvements now ready to work such changes, such mighty revolutions in England, and the author having been upon the spot, and having devoted some little time and attention to the subject, without further apology will, in a few subsequent papers, lay the results thereof before the public.

ON THE IMPORTANCE OF AGRICULTURE, AND THE BEST MEANS OF PROMOTING AND RECORDING ITS IMPROVEMENT.

By Mr John Hannam, North Deighton, Yorkshire.

It is customary for those who intend giving to the world any suggestions, in the outset to set forth the importance of the subject which they intend to illustrate, in order that the public may give that attention to their suggestions which the importance of the subject deserves, and that credit to the writer which an attempt, if it be nothing more, to illustrate such will always secure. Attended by such advantages I shall, in this case, follow the beaten path, and attempt to set before my readers the value of agriculture, and the *consequent importance of promoting its progress*, before I offer *any suggestions* for that purpose. Fortunately this is no difficult task: ancient history and modern experience equally proving the truth of Cicero's maxim, that " nothing is worthy of more estimation than agriculture,"—(" Nihil est agriculturâ melius.") If, indeed, we look to the past, whether we turn to Asia, to Africa, or to Europe; whether we trust to sacred or profane history, we shall not dare to question the truth of what must have been considered a self-evident axiom, by the very high estimation in which we find agriculture, as a science, and its cultivators, as a class, were held by the public. Thus, Holy Writ tells us that David, both before and after he was anointed king, employed himself in husbandry, and made a feast at the sheep-shearing; and that Rachel kept her father's flock. Speaking on this subject, the Abbé Henry, in his "Manners of the Israelites," says, "Gideon was thrashing corn when the angel told him that he should deliver his people, (Judges vi. 11.); Ruth got into the good graces of Boaz by gleaning at his harvest; and Saul, though a king, was driving oxen when he received the news of the danger Jabesh-Gilead was in, (1 Sam. xi. 5). Elisha was called to be a prophet as he drove one of his father's twelve ploughs, (1 Kings xix. 19.); the child that he brought to life again was with his father at the harvest when it fell sick, (2 Kings, iv. 18.); and Judith's husband, though very rich, got the illness of which he died on the like occasion, (Judith, vii. 3)."

Turning to profane records, we not only find this primæval regard for husbandry countenanced by individuals, but by nations; not only by ignorant and isolated people in remote regions, but by the most enlightened statesmen and rulers wherever the germs of national greatness began to appear.

Thus, in Persia and Assyria, not only were the satrapæ, or lieutenants of the provinces, promoters of agriculture, but they were themselves answerable to the supreme powers for the management of their respective districts, and were consequently punished or rewarded as the case might justify. In Egypt legislation was always conducted with a special regard to the interests, present and future, of agriculture; and Mago, the founder of Carthaginian greatness, wrote twenty-eight volumes on the subject of husbandry, which were held in such high estimation, that when Scipio sacked Carthage they were preserved, and presented to the Roman senate, who, *by a special decree*, ordered them to be translated into Latin; and the Romans consulted the writings with greater earnestness than the prophecies of the Sibyls. They were also translated into Greek by Cassius Dionysius of Utica.

Turn now to Europe. In Greece we have an Alexander growing his own wool, and wearing clothes woven from it by the hands of his empress. In Rome, when a monarchy, we find Numa Pompilius dividing the country into cantons, and keeping a register of the agricultural management of each, and a list of the most scientific farmers; whilst his grandson, Ancus Martius, not only carried out Numa's designs, but extended them, rewarding and punishing his subjects *according to their merits as farmers;* and entreating them to study the science of agriculture with greater zeal than any thing except religion.

In the golden age of the republic, too, have we a Cincinnatus, a Curius (speaking of whom Pliny says, "ipsorum manibus imperatorum colebantur agri"), and an Atilius Colatinus, who, twice consul and once dictator, "uno ore plurimæ consentiunt gentes primarium populi fuisse virum," (Cicero 17. 6. De Senec. and Orat. Rosc.), brought from the plough to the helm of state; and a Fabricius and a Camillus, trained to perseverance and honour by the severe labour of an hereditary farm, (Horace, Lib. i. Od. 12.)

And, at the most glorious period of its history, when all its riches and powers were united in one gigantic empire, we have the master spirit of the times, and who has given his name to the age, Augustus, employing himself, his family, and his people, in the pleasing, and, in a national point of view, profitable cares of agriculture. But it is useless to attempt to particularize all those luminaries of ancient days who have encouraged agriculture. A volume, much less this short sketch, would be very insufficient for this purpose, it will be allowed, when it is considered that the subject has been illustrated by the precepts and the practice of the founders of three of the most celebrated monarchies the world ever saw, and of *above twenty kings;* and when such men as Plato, Xenophon, Aristotle, Hesiod, Theocritus, Pliny, Cato, Columella, Palladius, Varro, Virgil, Cicero, Horace, &c., delighted to employ their pens in elucidating its practice, or in singing its praises.

Cicero (De Senec. cap. 15) says, that with the study he is "*wonderfully delighted*," because it is one that suits the philosopher; for he holds commune with an agent, the nature and properties of which may teach him many things in natural philosophy; but which, as it always *returns with interest* what it receives, may also give him as useful a lesson in moral philosophy. Xenophon, (Œcon. 1-12), long before this, alludes to the same; and Hesiod, probably the most ancient Greek poet, even anticipates him, telling us that we ought to draw a useful moral from the example of just gratitude with which the earth returns favours, giving more than she receives.

Pittacus, one of the seven sages of Greece, seems to have looked with the same eye of favour upon agriculture, for, when asked, "What is most faithful?" he replied, "The earth."—"What is most faithless?" "The sea." And, impressed with the same feeling, we find Virgil exclaiming, in a fine burst of poetry, (Georgics, 2. 240.)

"O fortunatos nimium, sua si bona norint
Agricolas, quibus ipsa, procul discordibus armis,
Fundit humo facilem victum *justissima tellus*."

In ages then, when kings, rulers, soldiers, statesmen, scholars, poets, and philosophers, united in encouraging agriculture, it is needless to add that peers and peasants would entertain similar feelings. Reason says that in all cases it would—it must be so; and history proves that in this it *was* so. Thus Xenophon records, and Cicero quotes with admiration, how Cyrus, when Lysander the Lacedæmonian came to him at Sardis, shewed him his trees, his flowers, and his fields, all laid out and cultivated with his own hand.

Columella tells us, in the preface to his work on agriculture, that at one time the chief men resided upon their country farms, and, when the public business required them, they were called from their rural employment into the senate. From his own writings we know how Cato (whose high estimation, or indeed passionate attachment to agriculture, is a matter of history) first became enamoured of the study, by walking over the farms of his neighbours, Manlius Curius Dentatus and Valerius Flaccus, and observing how these great men—the former of whom was the conqueror of Pyrrhus and three times consul, and the latter the conqueror of the Insubres and Boii, and Cato's own fellow consul—employed themselves. Alluding no doubt to these, as well as others, Cicero (Ch. 7. De Senectute) makes Cato say, that amongst his friends and neighbours were several men of advanced age, who pursued the study of agriculture with such zeal, that they never permitted any of the more important works to be done unless they were present to superintend the same.

But, had we not these written evidences of the attention of eminent individuals to agriculture, had we not so many men of the highest abilities, who appear to have devoted much of their time to the elucidation of agriculture, to prove that the subject must have been a very popular one, there are other sources from which we might have concluded that agriculture was not neglected. Thus, we learn that the small island of Sicily, both when in the possession of the Greeks, the Carthaginians, and the Romans, was so fruitful, that it yielded to the husbandman a hundred-fold return for his labour (Pliny), from which fertility it was called the granary of Italy. Whence, without any *further evidence*, we might have concluded that agriculture was *there, at least, in an advanced state.* And this conclusion would have been right, for Hiero, second king of Sicily, not only promoted the practice of agriculture by his powers as a monarch, but also as an author; for he wrote a work on agriculture much esteemed by his contemporaries. In the same manner, the fertility of Thrace, which sent to Athens annually 2,400,000 bushels of corn, and which is now almost barren, would have sufficed to shew that there, at least, agriculture must also have been esteemed and practised.

The same conclusion might be deduced from the present and ancient fertility of Egypt; for we are told, that from the plains which are now almost barren, Rome, when she degenerated and neglected her own agriculture, was annually supplied with an immense quantity of grain.

To what, in all these cases, can we impute this productiveness, but to the high estimation of agriculture, and the consequent great attention that was paid to it at that time; for, says Columella, when alluding to the decay of Roman fertility, "we ought not to imagine that the earth, which the great Architect of Nature has gifted with a perpetual fecundity, is liable to the disease of barrenness, after having received from its master an immortal youth, which has obtained for it the name of the *common mother* of all things." After telling us to what we should *not* impute this "falling off," he tells us to what we should. "It is neither," says he, "to the foulness of the atmosphere, nor to length of time, that the sterility of our lands is to be imputed, but to our own mismanagement and neglect. We should blame ourselves, who trust to the charge of servants and slaves those lands which were, *in the days of our forefathers, cultivated by the hands of the most noble and illustrious Romans!*"

But let us turn from the past to the present. Such *was* once the estimation of agriculture; *is* it the same *now?* Alas, no! At the present time it is the fashion to decry agriculture, as a stumbling-block to the prosperity of the country; and the sole business of thousands to instil into the public mind a contempt of the landowners and farmers of England, as an insignificant class, whose property and interests ought (England, they say, being a manufacturing country, and not an agricultural one) to be sacrificed to foster the march of manufacture; and, sorry am I to add, so indefatigable have been their efforts, and so speciously have their arguments been calculated to arouse the self-interest of their auditors, that thousands of intelligent and influential men have become so infected with their pernicious principles, as to petition Parliament to recognise their illiberal dogmas, and to commence a new system of legislation upon them; *i. e.* to give all protection to manufactures, and none to agriculture.

As a first step to this, they would repeal those laws which protect the landowner, the farmer, and the labourer, from that ruin which a free competition with the untaxed foreigner must produce; but would retain all those restrictions of the revenue upon those articles of foreign manufacture,—the hats, caps, ribbons, laces, boots, stockings, gloves, cloths, calicoes, chintzes, and, indeed, the every thing requisite for the rigging out of the outer man,—which the French, the Germans, and the Swiss, can supply us with cheaper than they can.

If it be said that agriculture has lost all claims to such estimation as it formerly was held in, I deny it! If that the claims which might be valid in other days are frivolous when compared with those of modern manufactures, I deny it as roundly; and one argument will justify me. Agriculture yields to the nation, *annually*, 250,000,000 of produce, and upon it 1,800,000 families depend for support; while manufacture produces only 150,000,000, of which only 50,000,000 is sold to foreigners. Thus, not only is agriculture the most productive, but it consumes (including what the manufacturers themselves use) two-thirds of their produce. Again, for the 150,000,000 which manufacture does produce it is indebted to agriculture, since the articles produced by manufacture are merely modifications or combinations of the products of agriculture. Whence Gibbon (Decline and Fall of the Roman Empire, chap. 2), says, " Agriculture is the foundation of manufacture; for the products of nature are the materials of art."

Even the all-potent argument, that scarcity, which strikes home to the poor man and makes many an abolitionist he knows not what of, is not insurmountable. It is in our power to destroy the tree by removing the root,—to silence the complaint by removing the cause; and the way to do this is expressed in two words,—improve agriculture! Give to the science that legislative protection, that popular estimation, and that individual attention which it deserves, and we shall soon be able to prove, and to *practical demonstration*, that England can produce bread, beer, and beef, sufficient to satisfy every hungry abolitionist in the kingdom. This is not visionary dreaming; for, though the agriculturist does greatly depend upon the seasons, it is possible, by the spread of agricultural science over the different soils of England, to nullify, in a great measure, their disastrous effects, and, setting aside any special visitation of Providence, to attain that *uniform plentiful supply* which must effectually silence discontented destructives. The same means *have* attained the same end; for we have it as a historical fact, that, in the time of Tiberius, when agriculture was at its zenith of prosperity, and prince and peer joined in promoting its best interests, the *populous and powerful* Roman empire never experienced those famines which often afflicted the infant republic.

That " nothing is better than agriculture," as I at first asserted, and, consequently, that *nothing is of more importance than its improvement*, will not, I think, now be questioned; for, if ancient example be not sufficient precedent, the wealth it annually produces, and its capability of thus rendering us independent of those who are aliens to us in name and in interests *for food*, and of securing us from the ruinous designs of wrong-thinking countrymen, will be an all-powerful talisman in making all who love their country, and regard as sacred the boundaries of property, not only agree to the *ancient sentiment*, but endeavour, to the utmost of their abilities, to work out the *modern corollary—to improve it.*

"What shall *I* do?" I hope some friend to agriculture, who, till now, has slumbered at his post, will ask or think. "What shall *I* do?" The answer is: Give your immediate and earnest support to every thing that will tend to improve the practice, or diffuse the science of agriculture. Foster the spirit, which is now beginning to spread, of scientific theory; for if we look to the history of manufactures for the last century,—if we see what it has done for them, we shall not doubt its capability of benefiting any practice to which it is applied; and if we look at what it has done within a much shorter period *for agriculture*,—the hand tillages which it has taught us to use, and the implements which it has produced, we may hope—*si ex pede Herculem*—great things for the future.

It may again be said: "I know this—I allow that we ought to support this spirit; but the question is, *How* are we to do so?" Support the means which have already been publicly propounded. They are three: 1*st*, To found an agricultural Professorship at our Universities. 2*d*, To establish agricultural Schools or Lectureships throughout the country. 3*d*, To form agricultural Societies and Farmers' Clubs in every principal market town. To support one or all of these every one can do something; and, doing this, he is *doing something* towards promoting the improvement of agriculture; for each suggestion, if carried out, contains the seed of much good. Thus,

1*stly*, By founding a Professorship at all our Universities, we shall not only be affording gentlemen an opportunity of obtaining a knowledge of the principles of agriculture—and if gentlemen become good farmers, they will be good landlords, and if they be both, their tenants will soon be good farmers too—but we shall secure to the cause of scientific agriculture the labours of at least three or four men of first-rate abilities. And there are plenty of practicalists who will test their theories.

2*dly*, If a college and model farm be established, though the common class of farmers will be debarred from participating in the course of studies, the knowledge instilled into the *few* will, in a short time, be spread amongst the many; while *all the experiments* carried on, and improvements made in management of the model farm, will be open to the eye of the world. If, however, the theoretical knowledge is given in a similar manner to what knowledge is imparted at our Scientific and Mechanics' Institutes,—if, in fact, there be a lectureship established, at which the middle classes *can* attend and obtain a knowledge of the primary principles of scientific agriculture, and a model farm, managed by the lecturer according to these principles, from which, in a higher course of lectures, he can adduce proofs of the advantages arising from such cultivation, and declare the result of investigations and experiments entered into, the advantage, in my opinion, must be much greater than in the former case. It has been proposed at York to establish a professorship and model farm for this purpose, but to make it *a branch of the York Collegiate School.* This, in my opinion, is not only impolitic but unjust. If the trustees of this school like to establish a lectureship on agriculture, *they* may do it; but for the public at large to support one, which, *ostensibly for the good of the whole community*, is confined exclusively to the supporters of one establishment, which is the private property of certain individuals, would be not only unfair towards every other establishment in the city and county, but absolutely inadequate to do that good which its supporters expect. But why is the professorship to be connected with *any establishment?* If the public supports it, the good resulting from it is public property, and the public ought to be admitted upon a proper scale of fees to the benefit of the lectures. Why, indeed, should not the whole community, young and old,—why should not every school, club, society, or individual in the country, have an equal opportunity of attending these lectures, and of receiving instruction in the principles of scientific agriculture, without it being incumbent on them either to receive or pay for any other instruction from persons whom, through religious, political, pecuniary, or other prudential reasons, they may have no wish to patronize?

In this way, thousands would receive a knowledge of the science before a hundred in the method proposed; for not only would every tutor consider it his duty to prepare and encourage his pupils to attend, but many, very many, young men of education, of some or no knowledge of science, would seize with avidity the opportunity of studying what would be of so much use to them. Many, too, *actually engaged in the world* as agriculturists, would not only listen to the precepts of science, but put them to *practice* quickly. From such, not only *hearers* of the word, but *doers* also, the improvement of agriculture would receive a greater and quicker impetus than can be imagined; for, cautious as the present class of farmers are of new plans, when merely built upon theory (which to most is but another name for speculation), when they come recommended by practice, it will be found, I think, that they are, generally speaking, as wide awake to their own interest as any other persons.

3dly, Of the advantages springing from agricultural associations, clubs, exhibitions, &c., tried as they have been (especially in Scotland and the north of England), it would seem supererogatory for me to speak. The effect of emulation upon the breed of stock, agricultural mechanism, and all kinds of produce, and the benefit to science from the geological surveys, chemical analysis of manures and soils, and reports on various systems of management, &c. (all of which it is the duty of societies of this sort to encourage to the extent of their means), speak for themselves; but there *is* one view of their advantages which may be overlooked. This is the mental benefit which accrues to the farmer individually; for is it possible for any man to leave such an exhibition without being, if not a better at least a *wiser man* than he was when he went? If he be a competitor, is it possible for him to prepare for the contest without maturing or extending his knowledge of the nature, characteristics, or peculiarities of the article he exhibits? If he be merely a spectator, can there be one "with soul so dead" as not to add one more wrinkle to his knowledge? Can he view so many specimens of what talent and attention *can* accomplish without admiration? Can he hear decisions given as to the respective merits of the animals or articles, without testing his own judgment? Can he, allow him to be one of the most illiterate men we can find, associate with the best informed men of his profession for a series of years, without rubbing off some of the rust of apathetic ignorance? No! If he looks on he must admire, and if he admires he will more or less imitate. If he tests his own judgment, he will find out his own deficiencies. If he listens to the "*sayings*" of his superiors, and sees them exemplified by "*doings*," he must respect though he does not fully comprehend.

In all cases, then, if nothing more, he will learn, what no mean philosopher considers the grand ultimatum of knowledge, to know himself, to see his own puny efforts in their proper light, and then to improve them. To what, indeed, but their extensive intercommunication, and their frequent association with men of every calibre, every calling, and every country, who have

> "Many towns and change of manners seen,"

can we attribute the boasted information and intelligence possessed by the operatives in manufacturing towns? To what, then, can we ascribe the comparative ignorance of the agricultural population, but to their isolated locations, and consequent slight intercourse, and retired habits? Any thing which brings men together with their minds intent on one subject, and the ignorant and the enlightened in contact with each other, while it does not injure the latter, must benefit the former. So, in this case, though some farmers, through the lack of education, may feel themselves out of their element, especially in those farmers' clubs where agricultural queries are investigated and discussed at stated times,—the seed of improvement, even on such ground, will not be without increase. When they see *effects*, they must appreciate though they cannot understand *causes*; and they will determine that their sons shall go on with the age though they cannot. The result, then, will be what is the chief and corner-stone of all systematic and permanent improvement in any science or art,—an extension of education amongst the very individuals who require it most.

That this spirit is creeping,—that a thirst after knowledge is increasing amongst farmers, none can deny. Within the last twenty years, I know—and few have better means of knowing—that, in Yorkshire, education has advanced, in this *particu-*

lar class, at least fifty per cent. in quantity, and I don't fear contradiction if I say as much per cent. in quality.

This gained, a spirit of inquiry and a knowledge of the value of education diffused more widely, and agriculture will quickly put forth those germs which, when matured, will compel labourer and land-owner, merchant and manufacturer, alike to allow that "nothing is better than agriculture," and entitle its professors and practicalists, individually and collectively, to take what is their due, a higher standing in the country, and to call for that consideration, both political and popular, which in the *past* times never was, in the present never ought to be, and in the future never again will be denied them.

And to accomplish this "consummation devoutly to be wished," agricultural societies and clubs seem to me no mean agents; like the noble river, which, with hundreds of tributary branches, drains many a lofty hill, and waters many a thirsty plain, in its sinuous windings, yet pours its waters at last through one channel into the bosom of the broad ocean,—in a thousand ways may we trace the operations of these societies; here giving an impetus to science, there enlisting the dormant powers of lethargic practice into active observation,—here ameliorating labour, there offering fresh fields for exertion,—here benefiting the purse, there the mind, yet always tending to one grand focus, the *improvement of agriculture.*

Before quitting the subject of agricultural associations, I would address a few remarks to those landowners and farmers of influence in their respective neighbourhoods, who, being members of the Royal, the Highland, or the Yorkshire Agricultural Society, conceive that they are doing their best to encourage agriculture. They are doing something; but they may do more. There are numbers of farmers—operative farmers we may term them, who, owing to their narrow means, can never hope to compete with the great breeders who would oppose them at the great shows; for these, then, the landowner should establish district societies, limited either to the tenantry on a certain estate, or to the inhabitants of certain townships.

Now, whatever degree of benefit may spring from the large and unlimited associations, the same will, in an equal ratio, arise from these local ones. Owing, as we have before said, to the limited means, deficient education, and isolated location of many farmers, agricultural knowledge is slow of diffusion. It is obvious, therefore, that the "old farmer" must be ***taught to creep*** before he will ***attempt to run;*** and that these private or parochial meetings will be the best preparatives. Improvements are brought to his door, and he must adopt them. The spark of emulation is fired, and he who would as soon attempt to fly as to compete with such men as Earl Spencer, shames to be outdone by his neighbour. Thus, the spirit of improvement spreads over the neighbourhood; similar societies are formed; they combine and form a nucleus or large association; the best stock is taken from the private to the larger meetings; till every village in the land has its well-bred stock, and the veriest dullard an opportunity of observing its superiority.

But, excellent as are the means which have been proposed, and which we have discussed in the preceding pages, when the friend of agriculture has supported these—as it is absolutely incumbent upon him to do—he has not done all. Many means of benefiting the cause may be suggested, or may accidentally offer themselves, which I am far from inferring should be neglected because they are not mentioned here; on the contrary, I would remind him that it will be his duty, as a good and faithful servant, to turn them to the very best account. If, however, these opportunities occur not, there is still one line which may be pursued. "Let every man," says some moralist, "mend *one;*" so let every farmer, if he can do ***nothing more,*** lend his best efforts to the study and improvement of his own farm. Every individual will, no doubt, exclaim here, "I do that already." Self-interest, it is true, teaches most to do this, as they themselves think; yet, it is equally true, that many may be what are commonly yclept "***good farmers,***" may work hard, clean well, and till well, and yet have no knowledge of the general principles of agriculture, nor even of the best system of sowing, ploughing, and cropping for their ***own farm.***

But why is this? Because they don't know "how to observe." Of the importance of this knowledge I shall not in this place say much, but refer the reader to those volumes which have been written to shew its necessity in the study of morals and manners, as well as of natural philosophy, (viz. "How to Observe Morals and Manners," by Miss Martineau, "How to Observe Geology," by Mr De la Beche, &c.)

To agriculture it is of equal consequence. Upon the land depends the prosperity of the farmer, and he must observe its features, disposition, and nature, as he would those of the arbitrator in whose hands he placed his property or his life. He must observe operations as well as results; he must observe those indirect causes, over which he has no control, and their effects, before he comes to any conclusion respecting the effect of those causes over which *he had control*; in fact he must "*observe*," analyse, and weigh all; the soil,—quantity and quality; the culture,—seed, tillage, and season; the crop,—corn, straw, and sample, before he can make any satisfactory deductions. To "*observe*" in this manner, he must, it is evident, *record* all that he observes, the agents as well as the results.

To some it may seem a labour of much trouble and complexity to do this. If done without a system it will be so,—it will be a "mighty maze," not only "without a plan," but *without a use*; yet is it far from being either one or the other necessarily. As a proof of this, I subjoin a specimen page of an "agricultural register," which neither requires great learning nor great leisure to use; but which will enable any one who can write to record his observations as regularly as the most scientific. *Vide* p. 472 and 473.

To make one of these the farmer has only to procure a quire of demy paper in half sheets, and have them stitched together at one end, so that they may open longitudinally. He must then rule them lengthwise, and after that divide the first two pages that face each other into divisions by transverse lines, and over each column insert the proper heading, as in the specimen.

In a similar manner every other two pages must be ruled. The method of entering observations will be seen from the specimen, from which we also see that, as each field requires two pages to itself exclusively, and that each year's observations only occupy about three lines across the page, a book of one quire will probably be sufficient for a farm of 200 acres of land, for five years at the least. Were I to circulate a large quantity of these books, made up with printed headings and directions, I am aware that it would be better; but the risk of such a heavy stock, unknown as their uses are, is more than I dare venture on; and as to advertising them into use, it would be a work of more cost than I feel called upon, as an individual, to incur. And I am convinced that it would be useless; such a system of complete observation would only be adopted extensively as it ought to be, if supported by the recommendation and notice of some powerful body or society, whose duty it is to promulgate all means of improving agriculture.

To those who may consider the trouble of this system of agricultural *espionage* and record more than its advantages would repay, I have two answers, in my own opinion conclusive ones, viz. that the labour is so trifling, that it is not worth mentioning, and that the advantages are so many and great, that they cannot be adequately mentioned.

Thus, as to labour, take a farm of 200 acres. Five minutes on any evening would suffice to record the work of that day, as far as it is required, in the proposed register, or half an hour to do the same for a whole week. The same at spring would suffice to record the *apparent* effect of his operations, and the same at harvest and at thrashing-time, to put down the *real* result of the same. And where is he who spends his time so well as not to have these minutes to spare? Were the labour ten times as great, the very pleasure (setting aside the benefit) of seeing upon one page every particular of the management and crop of any field in their farms, for a series of years, would be ample recompense to most intelligent men.

As regards the *advantages* of the practice proposed, it need only be said that they are the *advantages of observation*. What these are the annals of science will shew! Now, it is from science that agriculture expects much—from science that manufacture has gained much, but it is *to observation* that science owes much, and to it, therefore, must agriculture be also indebted. Observation is in fact at once the foundation and the finishing stone of the temple of science. Observation notes phenomena and records coincidences, and upon the strength of them we build theories. Observation furnishes corroboration, and then we draw conclusions:—these conclusions are the axioms and first principles of science.

In this manner has the sublime structure of astronomy been raised. Adam himself *observed* the courses of the heavenly orbs, or he could not have recorded his age at the birth of Seth. Seth also *observed* the motions of the stars; and Josephus, the Jewish historian, supposes that longevity was given them that their observations might be fully carried out, as it was only once in six hundred years that the sun and moon, &c. came exactly in the same position with respect to each other that they were in at the first. The Chinese, the Hindoos, the Chaldeans, and the Egyptians, have *records* of astronomical *observations*, taken at the most remote period of antiquity. Seneca, too, at a time when comets were regarded by the Romans as messengers of divine wrath,—

> ——— "who from their horrid hair
> Shook pestilence and war,"

says, "it is only by a close *system of observation* that a knowledge of their nature can be obtained." Every pillar that supports the noble structure of astronomy, every embellishment that from time to time has been added to it, has been dug from the quarry of observation. It is the same with every other branch of natural philosophy. The interesting, but incomplete science of geology, is but a string of *observed* facts and inductive conclusions, and chemistry a collection of *observed* phenomena and *recorded* experiments. In fact, whichsoever way we look, we find science dependent on observation. Experiment *does much* in *some studies*, but observation *more* in *all;* for it not only records the success or failure of all those experiments which man makes (which would be useless without that registration), but also the effect of *Nature's own experiments.* And these are neither few nor insignificant; many of the most useful facts in science bearing witness that

> Chance is the midwife that oft brings to view
> Nature's dark laws and Art's arcana too.
> An apple's fall thus led the searching eye
> To the deep mine of rich discovery.

Yet, in all these cases where accident lays bare,

And some unwitting son of chance,
Unvers'd in learning's wide expanse,
Stumbles upon the very plan
Eyes philosophic fail'd to scan,

it is still necessary for *observation* to be there; for, had Newton wiped from his memory "*all records*" that "*observation*

SPECIMEN OF A PROPOSED

NAME OF THE FIELD, LONG WARREN.—Thin, hungry, limestone soil.

A. D.	SEED.	QUANTITY SOWN PER ACRE.	HOW PUT IN.	WHEN.	TILLAGE AND QUANTITY OF MANURE PER ACRE.	QUANTITY OF LAND.	REMARKS ON THE STATE OF THE LAND OR WEATHER, &c.
1837 & 38.	Wheat, Scotch white.	3 bush.	Sown on furrow.	Nov. 1. 1837.	1½ qrs. of rape-dust.	A. R. P. 8 2 0	Land and weather very favourable.
	Do. Do	Do.	Do. pressed.	Do. Do.	Do. Do.	1 0 0	Do. Do. This is on land of average quality.
1839.	White Turnips (Norfolks).	3 ℔.	Drilled on ridges at 12 inches,	June 18. 1839.	5 tons of manure, & 1 qr. of bones.	5 0 0	I wish to try whether wide or strait ridges are best, and I have drilled alternate lands each way.
	Do. Do.	Do.	Do. at 18 in.		Do. Do.	5 0 0	
1840.	Barley, with small seeds.	2½ bush.	Drilled at 7½ in. apart.	April 7. 1840.	Sheep tillage, and 1 qr. of rape-dust.	10 0 0	I anticipate a good crop. The land is both firm and fresh, and the season fine.
1840-41.	Clover Seeds.	21 ℔.	Sown with barley.	. .	. . .	10 0 0	I have sown an equal quantity of rye-grass, red clover, and white do.
1841-42.	Wheat or Oats.						

copied there," would the grand problem in natural philosophy have been solved?

But it is unnecessary to enlarge further on this head; few will deny that Seneca's "*close system of observation*" is the royal road to all improvement,—in agriculture as well as astronomy. If, therefore, the Agricultural Register I have proposed facilitate *observation* or *systematize its records*, it is worthy of consideration as one more means of promoting the improvement of agriculture.

AGRICULTURAL REGISTER.

APPEARANCE WHEN COMING UP.	APPEARANCE BEFORE REAPING.	TIME OF REAPING.	PRODUCE.			GENERAL REMARKS, DEDUCTIONS, &c.
			STRAW.	CORN.	QUALITY	
Very sickly.	Very well.	Aug. 10.	354 stooks.	39 qrs. 2 b.	First rate.	It appears that pressing suits this limestone land. It prevents the *humus* from escaping too quickly, which it is apt to do in thin lands. Setting aside the science, the fact of having nearly 6 bushels per acre more than by the old plan will make me try it on.
Rather better.	Do. do.	Do. do.	70 do.	8 qrs. 4 b.	Do. do.	
Well. Rather injured by the fly.	Pretty regular. Rather small.	Eaten in Dec. 1839.	Valued at 16 tons p. acre.	Kept 100 sheep.	9 weeks & 4 days	From this I see that wide ridges are best in every point of view. 1*st*, The seed being more together, there is less danger from the fly, and more plants to select from when hoeing; and, 2*dly*, Having finer plants, more regularity, and more room for them to grow, we have a *heavier produce at last*.
Luxuriantly. The plants being more numerous, the fly has no power over them.	Very large. No wants.	Eaten in Nov. 1839.	Do. at 20 do.	Do. 100 do.	Twelve weeks.	
Sickly, and I fear rather thin. The heavy rains have starved it.	Beautiful. Plenty of straw, and splendid ears.	Aug. 18 to 22. 1840.	1041 stooks and five sheaves.	52½ qrs.	Good.	The seasons have favoured me. I feared at spring that this would fail, but the tillage has done its duty. When thrashed, I expect my '*produce*' will look well, for such ears I have seldom seen. This barley is mown, which accounts for the great number of stooks of straw. My anticipations of a crop are realised.
Very well.						

SIR ANTHONY FITZHERBERT'S "BOKE OF HUSBANDRYE," AND THE EARLY ENGLISH FARMERS.

By Cuthbert William Johnson, Esq., Corresponding Member of the Maryland Horticultural Society.

That the earliest English writer upon agriculture should be a learned judge of the Court of Common Pleas, distinguished for his legal knowledge, and for his valuable law works, which were long the text-books of the student, may to some appear almost as remarkable as that Julia Berners, a fair nun of St Albans, should be our first author who wrote upon the delights of hunting, and other rural masculine sports. But, as I have in another place had occasion to observe, some of the greatest improvements in agriculture have emanated from persons who were not bred to the profession of a farmer. Menzies, the inventor of the thrashing-machine, was a Scotch advocate; Jethro Tull was a barrister; Richardson, Lettsom, and many other learned physicians, have aided very materially the introduction of new plants into agriculture. Davy and other chemical philosophers, by their researches in agricultural chemistry, have in many very important ways assisted the cultivator; the celebrated Arthur Young was bred to commerce. It may not be an uninteresting research before entering upon the "Boke of Husbandrye" of Fitzherbert, if I shortly examine the state of farming previous to the publication (in 1532)[*] of the learned Judge's work.[†] The historian of Bri-

---

[*] There is some reason to believe, that the first edition of this work appeared in 1523.

[†] I am aware, when I say that this was the first English book on husbandry, that there was a work *printed* in English thirty years before Fitzherbert's, viz. in 1500; but that book was a translation from the French, and is thus described by my brother, Mr George Johnson, in his "History of English Gardening," p. 47.

"A Boke of Husbandry, London, 4to. This little work is very rare, being one of the productions from the press of Wynkin de Worde. It consists of but twelve leaves, and is without date, but certainly was not of a later year than 1500. The following extracts explain its nature:—

"Here begyneth a treatise of Husbandrye, which Mayster Groshede, somtyme Bysshop of Lincoln, made and translated it out of Frensshe into tish Agriculture has not the least trace of authority from which he can obtain information of its state beyond the period when the Romans invaded this island, and the annals of even that period are meagre and unsatisfactory.

When Cæsar arrived in England about fifty-five B. C., he describes the Cantii, or people of Kent, and the Belgæ, inhabiting the modern counties of Somerset, Wilts, and Hants, as much more advanced than the rest of the people in the habits of civilized life. They cultivated the soil, employed marl as a manure, stored their corn unthrashed, and freed it from the chaff and bran only as their daily demands required. The interior inhabitants lived chiefly upon milk and flesh, being fed and clothed by the produce of their herds. " The country," adds Cæsar, " is well peopled, and abounds in buildings resembling those of the Gauls, and they have a great abundance of cattle ; they are not allowed to eat either the hen, the goose, or the hare, and yet they take pleasure in breeding them."—(*Cæsar*, v. cap. 10 ; *Strabo*, iv. 305 ; *Diodor. Sic.* v. 301 ; *Pliny*, xvii. 4.) Cicero, in one of his letters says, " There is not a scruple of money in the island, nor any hopes of booty but in slaves."—(*Lib.* iv. *Ep.* 17.)—a description that the industry and intelligence of succeeding ages has rendered singularly inapplicable. The first steps in that improvement were owing to the Romans themselves. Rutilius has elegantly and correctly said, that Rome filled the world with her legislative triumphs, and caused all to live in one common union, blending discordant nations into one country, and, by imparting a companionship in her own acquirements and laws, formed one great city of the world.

Agricola was the chief instrument in imparting to the Britons the improved arts and civilization of the Romans.

> " To wean them from their savage habits, Agricola held forth the baits of pleasure, encouraging the natives, as well by public assistance as by warm exhortations, to build temples, courts of justice, and commodious dwelling-houses. He bestowed encomiums on such as cheerfully obeyed ; the slow and uncomplying were branded with reproach, and thus a spirit

---

Englyshe, whiche techeth all manner of Men to govern theyr Londes, Tenementes, and Demenes ordinately."

" Here endeth the Boke of Husbandrye and of Plantynge, and Graffynge of Trees and Vynes."

of emulation diffused itself, operating like a sense of duty. To establish a plan of education, and give the sons of the leading chiefs a tincture of letters, was part of his policy. By way of encouragement he praised their talents, and already saw them, by the force of their natural genius, rising superior to the attainments of the Gauls. The consequence was, that they who had always disdained the Roman language began to cultivate its beauties. The Roman apparel was seen without prejudice, and the toga became a fashionable part of dress. By degrees the charms of vice gained admission to their hearts; baths, porticos, and elegant banquets grew into vogue; and the new manners, which, in fact, only served to sweeten slavery, were by the unsuspecting Britons called the arts of polished humanity."—(*Tacitus, Agricola* xxi.) Thus eloquently does Tacitus describe the diffusion of the Roman arts amongst the early natives of our island; and that agriculture was one of these in which they so rapidly improved is attested by the fact that, in the fourth century, the emperor Julian, having erected here granaries in which to store the tributary corn that he exacted from the natives, at one time sent a fleet of 600 large vessels to convey away the store they contained. Julian himself particularizes the transaction. "If," says Gibbon, "we compute those vessels at only seventy tons each, they were capable of exporting 120,000 quarters, and the country which could bear so large an exportation must have attained an improved state of agriculture."—(*Dec. and Fall of Rom. Emp.* cap. xix.)

Possessing this improved agriculture, our country was successively subdued by the Saxons, the Danes, and the Normans; but as these all came to improve their fortunes, and to win the comforts of life, agriculture continued to flourish; her operations were interrupted, her products destroyed, in whichever direction swept the tide of war; but no sooner was peace restored than the inhabitants, though of varied extraction, united their knowledge in the pursuit of this art, on which not only their comfort but their existence so chiefly depended. A similar summary observation applies to all succeeding ages; our agriculture has continued slowly to improve in spite of every obstacle that has occasionally delayed, or that has permanently retarded its advance.

Tenures—Size of Estates.—The native Britons, it is very certain, appropriated but small portions of the land for raising corn or other cultivated vegetables, and the rest of the country was left entirely open, affording a common pasturage for their cattle, and pannage for their swine. Under the Roman government, we have seen that the extent of cultivated ground must have considerably increased; yet the oldest writers agree that by far the greatest proportion of the country was occupied by heaths, woods, and other unclaimed wastes.

When the *Saxons* established themselves in the island, an almost total revolution in the proprietorship of the lands must have occurred. The conquest was only acquired after a bloody struggle; and what was won by the sword was considered to possess an equitable title that the sword alone could disturb. In those iron days it was considered that the lands of a country all belonged to the king; and on this principle the Saxon monarchs gave to their followers whatever districts they pleased as rewards for the assistance afforded in the conquest, reserving to themselves certain portions, and imposing certain burthens upon each estate granted.—(*Coke's Littleton*, 1–58.; 2 *Black. Com.* 45, &c.) This was only a continuance of that feudal system which prevailed upon the continent, and we may take the county of Sussex as an example how the land was carved out amongst the aristocracy, reckoning a *hide* at 100 or 150 acres.

	Hides.		Hides.
The King had . . .	59½	Comes of Oro . . .	196¼
Archbishop of Canterbury .	214	Comes Roger . . .	818
Bishop of Chichester . .	184	William of Braiose . .	452¼
Abbot of of Westminster .	7	Abbot of St Edward .	21
Abbot of Feschamp . .	135	Comes Moriton . .	520
Bishop Oborn . . .	149	William de Warrenno .	620¼
Abbot of Winchester .	33	Odo and Eldred . .	10
Church of Battle . .	60½		

These great proprietors granted the chief part of their estates to the actual cultivators of the soil, receiving in general from the under tenants certain proportions of whatever might be the productions of the farms. Thus we find one tenant stating,—“ I give food for 70 kine in that woody allotment, called Wulfendinleh, and 5 waggons full of good twigs, and every year an oak for building, and others for necessary fires, and sufficient wood for burning (*Bede, Hist. Append.* 970). The rent of 10 hides of land was even regulated by two laws of King Ina. They enacted that the tenant of such extent of land, should render to the lord 10 vessels of honey, 300 loaves, 12 casks of Welsh ale, 30 of clear ale, 2 old rams, 10 wethers, 10 geese, 20 hens, 10 cheeses, 1 cask of butter, 5 salmon, 20 lb. of fodder, and 100 eels; or else 10 mittas of malt, 5 of grits, 10 of wheat flour, 8 gammons, 16 cheeses, 2 fat cows, and, in Lent, 8 salmon (*Wilkin's Leges Saxon.* 25–3; *Gale's Hist. R.* 450). Such grants were usually to the tenant and his heirs for ever, so long as they afforded the accustomed rent; and I am not aware of any lease or other grant extending for a shorter period than the life of the tenant. An example of these occurs in the year 852, when the abbot and monks of Medehamsted let some land at Sempingham to a tenant named Wulfred, for his life, on condition that he annually paid them 60 fother of wood, 12 fother of græfan (coals), 6 fother of turf, 2 tons of clear ale, 2 killed oxen, 600 loaves, 10 casks of Welsh ale, 1 horse, 30s., and a night's lodging."—(*Saxon Chronicle*, 75.)

As this feudal system declined, and was finally extinguished in the twelfth year of Charles II., so proportionately did the landed interest increase in prosperity. Freed from the burthen of furnishing a soldier and his armour for every certain number of acres, and all restrictions as to land changing hands being removed, and the numerous impositions being got rid of with which the lords oppressed their sub-infeudatories, it soon became a marketable species of property; and as money and merchandise increased, and the proprietor lived less upon his estate, it soon became the most eligible plan for both landlord and tenant that the whole rent should be paid in money.

Of the size of these early farms we have no precise information; but from the laws of Ina we may perhaps conclude that a hide of land, equal to about 100 or 120 acres, was the customary size; for, in speaking of the produce to be given to the lord for ten hides, the law speaks of the smallest division of each county, of which it was particularly cognizant, namely, of ten families, or a *tithing*, as they were collectively called. Again, Bede expressly calls a hide of land *familia*, and says it was sufficient to support a family. It was otherwise called *mansum*, or *manerium*, and was considered to be as much as one could cultivate in a year.—(*Henry of Huntingdon*, vi. 2066.)

That the boundaries of these farms or manentes were well defined is certain, for we have many grants in which they are detailed. The following is one of the shortest; it bears the date of 866. "From Sture on the Honey Brook, up behind the Brook on the old hedge; along the hedge on the old way; along the way on the great street, along the street on four boundaries; then so to Calebrook, along the brook; then to Horsebrook, along the brook, then so to the ditch, along the ditch to the store again; on the store to the ditch that is called Thredestreo, along the ditch to the Heasecan Hill; from that hill to the ditch, along the ditch to Wenforth, along Wenforth, and then again to the Sture."—(*Smith's Append. to Bede*, 770.)

War succeeded war, and chivalry and the chase were the engrossing occupations of the landed proprietors during the whole of the middle ages; yet amid all these convulsions, and all this neglect, agriculture continued to obtain a similar degree of attention, and its practitioners to occupy a similar humble yet more independent station of life. Bishop Latimer flourished in the first half of the sixteenth century, and his father was among the most respectable yeomen of his time, yet his farm evidently did not exceed 100 acres: "My father," says Latimer, "was a yeoman, and had no lands of his own; he had only a farm of three or four pounds by the year at the utmost; and hereupon he tilled as much as kept half a dozen men. He had a walk for 100 sheep, and my mother milked thirty kine," &c.—(*Latimer's Sermons*, p. 30.) But that this class of society was then not very refined is proved by Sir Anthony Fitzherbert in his Boke of Husbandrye; for he declares, when speaking of farmers' wives of 1532, "It is the wife's occupation to winnow all manner of corn, to make malt, to wash and wring, to make hay, to shear corn, and in time of need to help her husband to fill the muckwain, or dung-cart, to drive the plough, to load corn, hay, and such other; and to go or ride to the market to sell butter, cheese, milk, eggs, chickens, capons, hens, pigs, geese, and all manner of corn."

Enclosure of Land.—It is a rule, founded upon general observation, that the most enclosed country is always the best cultivated; for, as Sir Anthony Fitzherbert observed in the reign of Henry VIII., live stock may be better kept, and with less attendance, closes be better alternately cropped, and the crops better sheltered in inclement seasons, "if an acre of land," he concludes, "be worth sixpence an acre before it is enclosed."

We have seen, in a previous page, that hedges, ditches, and other fences marked the boundaries of the early Saxon estates; and these were certainly not adventitious distinctions, for they are mentioned in most of the Saxon grants of which I am aware, and strictly regulated and protected by law. If a tenant omitted to keep his farm enclosed, both in winter and summer, and to keep his gate closed; if any damage arose from his hedge being broken down or his gate being open, he was declared to be legally punishable; if a freeman broke through another's hedge, he was fined sixpence.—(*Wilkin's Leg. Sax.* 21.)

As our woollen manufactures improved, the demand for our broad cloths became excessive not only in our own but in the continental countries, and the consequent consumption of wool was so large, and the price was so enhanced, that self-interest dictated to the landed proprietors, even in the reign of Henry III., that the enclosure of their manorial wastes on which to feed sheep upon their own account, or to let out as pasture farms, would be a source of extensive emolument. The statutes of 20th Henry III., 13th Edward I., and others, were consequently passed for sanctioning and regulating the practice. The demand for woollens continued, and became so great that rapidity of manufacture was the chief consideration; "yet ill as they are made," says King Edward VI. in his private journal, "the Flemings do at this time desire them wonderfully." The consequences are depicted by the same genuine authority: "The artificer will leave the town, and for his mere pastime will live in the country; yea, more than that, will be a justice of the peace, and scorn to have it denied him, so lordly be they nowadays; for they are not content with 2000 sheep, but they must have 20,000, or else they think themselves not well. They must have twenty miles square their own land; or full of their farms; four or five crofts to live by is too little—such hell-hounds they be."—(*King Edward VI.'s Remains*, p. 101.) The rents of land were in consequence enormously raised, and the corn farmers were ruined. "They everywhere," says Roger Ascham, "labour, economize, and consume themselves to satisfy their owners. Hence so many families dispersed, so many houses ruined, so many tables common to every one taken away; hence the honour and strength of England, the noble yeomanry, are broken up and destroyed."—(*Ascham's Epistles*, 293–5.) Bishops Scory, Latimer, and others, raised their voices in their behalf, and hurled their invectives from the pulpit upon those who oppressed them: "Let them," said Latimer, in a sermon preached before the King, "let them have sufficient to maintain them, and to find them in necessaries. A plough land must have sheep to dung their ground for bearing corn, they must have swine for their food to make their bacon of, their bacon is their venison, it is their necessary food to feed on, which they may not lack; they must have other cattle, as horses to draw their plough, and for carriage of things to the markets, and kine for their milk and cheese, which they must live upon and pay their rents."

The evil of converting arable land into pasture cured itself. The increased growth of wool in other countries, and the improvement of the manufactures, by degrees caused the production of it in England to diminish; and as dearths of corn occurred, and the consequent enormous increase of its value rendered its growth more lucrative, pasture land gradually returned to the dominion of the plough. Since that period enclosures have gone on with various but certainly continued degrees of activity. More than 3000 enclosure bills were passed in the reign of George III. The land so enclosed was, and is chiefly dedicated to the growth of corn; but since the field-culture of turnips was introduced in the seventeenth, and mangel wurzel in the nineteenth century, with other improvements in our agricultural produce, almost every farm is now enabled to combine the advantages of the stock and tillage husbandry.

Implements.—We find in the earliest of our national records that the *plough*, the most important implement of husbandmen, was then of a very rude construction. In general form it rudely resembled the plough now employed, but the workmanship was singularly imperfect. This is no matter of surprise, for amongst the early inhabitants of this country there were no artificers. The ploughman was also the ploughwright. It was a law of the early Britons that no one should guide the plough until he could make one, and that the driver should make the traces, by which it was drawn of withs or twisted willow, a circumstance which affords an interpretation to many corrupt terms at present used by farming men to distinguish the parts of the cart-harness: thus the *womb withy* has degenerated into *wambtye* or *wantye; withen trees* into *whipping* or *whipple trees;* besides which we have the *tail withes* and some others still uncorrupted.—(*Leges Wallicæ*, 283–8.) We read also that Easterwin, Abbot of Wearmouth, not only guided the plough, and winnowed the corn grown on the Abbey lands, but also with his hammer forged the instruments of husbandry upon his anvil.—(*Bede, Hist. Abb. Weremoth*, 296.) Whether the early British or Saxon ploughs had wheels is uncertain, but those of the Normans certainly had such appendages. Pliny says that wheels were first applied to ploughs by the Gauls. The Britons were forbidden to plough with any other animal than the ox; and they attached any requisite number of oxen to the plough. The Normans had been accustomed in their light soils to employ only one or at most two. (*Leges Wallicæ*, 288*; Montfaucon's More Fran.* i. 47*; Girald. Camb.* c. 17.)

Crops.—It is probable that wheat was not cultivated by the early Britons, for the climate, owing to the immense preponderance of woods and undrained soil, was so severe and wet, that in winter they could attempt no agricultural employments, and even when Bede wrote, early in the eighth century, the Anglo-Saxons sowed their wheat in spring.—(*Bede's Works*, 244.) The quantity cultivated in the reign of Henry III. does not appear to have exceeded the quantity necessary for the year's consumption of the then thin population of England; for in a very wet and inclement season in 1270 wheat sold for six pounds eight shillings per quarter, which, calculating the difference of the value of money, was equal to twenty-five pounds of our currency. It continued an article of comparative luxury till nearly the seventeenth century commenced; for, in the household books of several noble families, it is mentioned that *manchets*, and other loaves of wheat-flour, were served at the master's table, but there is only notice taken of coarser kinds for the servants. That the cultivation of wheat in England was very partial in the reign of Elizabeth is attested by Tusser, who, writing at that period, says,

In Suffolk again, whereas wheat never grew,
Good husbandry used, good wheat land I knew.

As our climate has improved by the clearing and drying of the surface of the country, so proportionately has the cultivation of wheat extended.

It was probably owing to our fickle and inclement climate rendering the successful completion of harvest a much rarer and more hazardous event than now, that our forefathers made on the occasion such marked and joyous festivities. We do not know the motive that actuated the farmer, but no dread of an uncertain harvest could have made him more prompt and vigorous who, in 1389, cut and stored two hundred acres of corn in two days. The account is given in "The History of Hawstead." About two hundred and fifty reapers, thatchers, and others were employed during one day, and more than two hundred the next. The expenses of the lord on this occasion are thus stated: 19 reapers, hired for the day at their own board, 4d. each; 80 men, one day, and kept at the lady's board, 4d. each; 140 men, hired for one day at 3d. each; wages of the head reaper, 6s. 8d.; of the brewer, 3s. 4d.; of the cook, 3s. 4d.; 30 acres of oats tied up by the job, 1s. 11d.; five pair of gloves, &c. The crops, however, of those days must not be compared in bulk with those of the present period, either in the amount of straw or in their produce of seed.

It is hardly necessary to remind any modern farmer of the rude mode in which in those stern days, when feudalism was only in the decline—when the cultivator was hardly better off than a modern Polish boor—the lands of England were cultivated. The produce of the farms in those times, as we learn from the few reports which have escaped to us, must have been miserable indeed. In 1387, the Manor farm of the parish of Hawstead in Suffolk produced on

66 acres of wheat only 69 qrs. 2 bush. of seed,
26 ... barley ... 52 ... 2 ... ...
62 ... oats ... 40 ... 4 ... ...
25 ... pease ... 25 ... 3 ... ... [*]

[*] *Cullum's Hawstead.*

And about the same period, on a farm in the manor of Dorking in Surrey,

30½ acres of barley yielded only 41 qrs. 4 bush. of grain,
28 ... oats ... ... 38 ... 4 ... ... *

Barley was long the grain the most extensively cultivated in England. It appears on the coins of the early Britons (*Camden by Gibson*, lxxxviii.); it was not only the grain from which their progenitors, the Cymri, made their bread, but from which they made their favourite beverage beer.

Oats being well known and cultivated by the Germans and other continental nations when Pliny wrote, they were also most likely known to the cultivators of this island in the earliest times. In all stages, even to the present time, bread made of oatmeal has been a very prominent part of the food of the inhabitants of the northern parts of Britain. "In Lancashire," says Gerarde, in 1597, "it is their chiefest bread-corn, for jamrocks, haver-cakes, thorffe-cakes, and those which are called generally oaten-cakes, and for the most part they call the grain haver, whereof they do likewise make drinke for want of barley." This grain, from its hardiness, is admirably adapted for a cold climate; and there is scarcely any soil on which it will not be productive. In southern climates it will not flourish.

"*Rye*," says Gerarde, "groweth very plentifully in most parts of Germany and Polonia, as appeareth by the great quantity brought into England in times of scarcity of corn, as happened in the year 1596. It growethe likewise very well in most parts of England, especially towards the north."

Pease have been extensively cultivated in England from a very early period. Lentils were first brought into this country about 1548. Tares, according to the great Ray, were cultivated as a field-crop, and given as fodder to horses in 1566. Turnips were never much cultivated as a field-crop until nearly the end of the seventeenth century. Potatoes came from America about the year 1586, with Sir Walter Raleigh. Hops, though indigenous to this country, were little attended to, and never employed in brewing till the sixteenth century, and then, when they began to be more used, the citizens of London petitioned Parliament to prevent them as a nuisance. " It is not many years since," says Walter Blyth, writing in the year 1653, " the famous city of London petitioned against two nuisances, and these were Newcastle coals, in regard of their stench, &c., and hops, in regard they would spoil the taste of drink and endanger the people."—(*English Improver*, 240.)

---

* *Archæologia*, v. xvii., 30. *Brit. Husb.* v. i. p. 19.

General Cultivation.—We have no information as to whether the early inhabitants of Britain varied their modes of ploughing with the nature of the soil. They sometimes ploughed with two oxen, sometimes with more, some ploughmen, represented in very old pictures, evidently drove the team as well as guided the plough, but it was usual for them to have a driver. There is a very old Saxon dialogue extant, in which a ploughman in stating his duties says:—" I go out at daybreak, urging the oxen to the field, and I yoke them to the plough—the oxen being yoked, and the share and cultro fastened on, I ought to plough one entire field or more. I have a boy to threaten the oxen with a goad, who is now hoarse through cold and bawling. I ought also to fill the bins of the oxen with hay, and water them and carry out their soil." —(*Turner's Anglo-Sax.* 11–546.) Repeated ploughings and fallowings to prepare the soil for wheat was the common practice; for Giraldus Cambrensis, speaking of the Welsh, says with astonishment, " they ploughed their lands only once a-year, in March or April, in order to sow them with oats, but did not, like other farmers, plough them twice in summer, and once in winter, to prepare them for wheat."—(*Descript. Camb.* c. viii.) In a law tract called Fleta, and written early in the fourteenth century, are given several agricultural directions, especially upon dressing and ploughing fallows. In summer the ploughing is advised to be only so deep as to bury and kill the weeds, and the manure not to be applied till just before the last ploughing, which is to be deep.—(*Fleta*, lib. 11. c. 73.)

The celebrated tapestry of Bayeux represents a man harrowing, one horse only is employed, and one harrow. In the time of Heresbachius, though harrowing was the usual mode of covering the seed, yet he says, " in some places it is done with a board tied to the plough." Rakes seem to have been employed by the Anglo-Saxons, for the accurate researches of Mr Turner do not appear to have discovered any mention of other implements that were employed by them for that purpose.—(*Anglo-Sax.* 11–544.)

I find no mention of hoeing by any of our early agricultural writers, though there is generally some directions for "plucking up the naughty weeds." Heresbachius is the first that I have met with who notices the advantages of loosening the surface of the soil about growing crops, although he gives a very erroneous explanation of the effects produced. "Sometimes," he says, "raking is needful, which in the spring loosens the earth made clung by the cold of winter, and letteth in the fresh warmth. It is best to rake wheat, barley, and beans twice. Moreover they break asunder with a *roller* the larger and stiffer clods."—(*Googe's Heresb.* 256.) It was not till the time of Tull, however, 1731, that the due importance of this practice was appreciated.

Live Stock.—Cattle and sheep were the chief riches of the Britons when they became known to the Romans.—(*Cæsar*, v. c. 16.) In a very early Saxon manuscript, a shepherd is represented as saying, "In the first part of the morning I drive my sheep to their pasture, and stand over them in heat and cold, with dogs, lest the wolves destroy them. I lead them back to their folds, and milk them twice a-day; and I move their folds, and make cheese and butter."—(*Anglo-Sax.* 11–546.) This attention to sheep was attended with so much success that they became an object of acquirement by the Continental nations; and in the reign of Edward IV., at the time a treaty of peace was concluded with Spain (1466), a license was granted by that monarch "for certain Coteswold sheep to be transported to Spain, as people report, which have there so multiplied and increased, that it hath turned the commodity of England much to the Spanish profit, and to the no small hindrance of the gain which was beforetime in England raised of them."—(*Hall's Chron.* 266, *Hollinshed*, 668.) The sheep thus exported were probably improved by attention and climate till they had become that breed of Merinoes which were reimported to this country early in the present century. The statute 3d Hen. VI. c. 2, forbids the exportation of sheep. The fears which old chroniclers may have ignorantly entertained, that the exporting of sheep would be injurious to our native commerce, have, in all succeeding years, been proved to be fallacious. The demand for our wool was so large, and the consequent increase of the breed of sheep was so great, that an impolitic legislature, in 1533, endeavoured to check it. The preamble of the act states, that "divers of the king's subjects, to whom God of his great goodness hath disposed great plenty and abundance of movable substance, now of late, within few years, have daily studied, invented, and practised ways and means to accumulate into few hands, as well great multitudes of farms as great plenty of cattle, and in especial sheep, putting such lands as they can get to pasture, and not to tillage, whereby they have not only pulled down churches and towns, and enhanced the old rates of the rents, so that no poor man is able to meddle with it, but also have raised the prices of all manner of corn and cattle, &c. almost double above the prices accustomed, to the great injury, &c. of his Majesty's subjects; and as it is thought that the great occasion of this accumulation is the profit that cometh of sheep, which now become to a few persons' hands of this realm, that some have 24,000, some 20,000, &c. by which a good sheep for victual, that was accustomed to be sold for 2s. 4d., &c., is now sold for 6s., &c., which things thus used be to the high displeasure of Almighty God, to the decay of the hospitality of this realm, to the diminishing of the King's people, and to the let of clothmaking, &c." It then enacts that no one shall have more than 2000 sheep, though, as a subsequent section declares, every hundred to consist of six score, the limited number was 2400. And it further enacts that no man shall have more than two farms.—(25th *Hen. VIII.* c. 13.)

Harrison, who died in 1593, describes our sheep as very excellent "sith for sweetness of flesh, they pass all other. And so much are our wools to be preferred before those of Milesia and other places, that if Jason had known the value of them that are bred and to be had in Britain, he would never have gone to Colchis to have looked for any there."—(*Des. of Eng. pre. to Hollingshed*, 220.) The German agriculturist Heresbach, who was a contemporary, gives such a description of the best form and qualities of sheep, that it is evident that the excellence of our breed was not the mere effect of chance.—(*Googe's Herb.*) From that period till the latter half of the eighteenth century, we are not acquainted with any efforts further to improve it,—the last mentioned period was the era of the improvements effected by Mr Bakewell and his pupils the Messrs Culley.

Cattle, as I have already noticed, have always been a prominent production of this country,—they were mentioned by Strabo, Cæsar, and other ancient writers. They have ever since continued, more or less, to particularly engage the attention of the husbandman, not only for the dairy and the plough, but also as a source of food. The breeding of cattle, however, had been so much neglected for the more profitable pasturage of sheep, that, in 1555, an act of Parliament was passed to remedy the evil. The preamble states, that "forasmuch as of late years a great number of persons in this realm have laid their land, farms, and pastures, to feeding of sheep, oxen, runts, scrubs, steers, and heifers, &c., having no regard or care to breed up young beasts and cattle, whereby is grown great scarcity of cattle and victual," and therefore it is enacted that a cow shall be kept wherever there are sixty sheep, and a calf reared wherever there are 120, &c.—(2d and 3d *Will. and Mary*, c. 3.) Many other legislative enactments occur in the records of that and contiguous periods, but reason and interest are better promoters of improvement than acts of Parliament. Bakewell did more by his own unaided exertions to improve the breed of cattle than all the efforts of the Legislature since the conquest.

Horses. That the ancient Britons had horses, with which they impelled their war-chariots, we know upon the authority of those who had seen them,—Cæsar, Strabo, and others. In the epitome of Dion Cassius, by Xiphelia, those horses are described as small and swift. They appear not to have been usually employed in the operations of agriculture, and their employment was not considered to be desirable, for, in the old Cambrian Laws, the use of oxen is exclusively directed. (*Leges Wallicecæ*, 288.) Under the Saxons, and still more under the Normans, who flourished here in an age that, from its excelling in noble horsemanship, has been distinguished as the *Chivalric*, the breed of horses was undoubtedly improved. "Richard de Rulos, Lord of Brunne and Deeping, was much addicted to agriculture, and delighted in breeding horses and cattle." (*Ingulphus's Chron.*, lib. i.) In the year 1494 the exportation of horses was so extensive, and the price of them in this country was so much enhanced, that an act of Parliament ordained that none should go out of the realm without the king's license; (2d *Henry VIII.*, c. 6; 32, c. 13; 33, c. 5;) but these being evidently intended for the improvement of war-horses "for the defence of the realm," would only collaterally benefit those employed by the husbandman. It was provided by the second of the acts just quoted, that no stallion should be kept that did not measure fifteen hands from the sole of the hoof to the highest part of the wither, each hand to be four standard inches. We find, however, that at that period our draught-horses were fine powerful animals; for Harrison, who lived at this era, and whose appendix to Holingshed I have before quoted, after expressing his admiration of them, says, that three or four of them would draw with ease three thousand weight of the greatest tale for a long journey. We must remember, too, that in those days the roads were totally different from what they are at present. It is within the memory of persons still living in the Hundreds of Essex, that no more than a load of wheat was ever sent out in a waggon, the roads there being, until within less than half a century, exceedingly bad.

I have already noticed that in the tapestry of Bayeux a man is represented harrowing with a horse. That tapestry was woven in the year 1066; and this representation is the first notice of which I am aware of the horse being employed in agriculture. The first attempt that our historians notice to improve the breed of our husbandry horses was in the reign of King John. Tyrant and despot as he was, yet his evil qualifications gave two benefits to England. His tyranny gave birth to Magna Charta, and his pride rendering it hateful for him to see foreigners surpass him in the excellence of their horses, induced him to import one hundred stallions from

Flanders; and from that era may be dated the improvement of our draught-horses. His object did not entirely succeed, for a century subsequently, in the reign of Edward II., we find that horses were still imported from Lombardy and Flanders. I have already noticed some of the enactments to improve our breed of horses, but these shared the fate of most compulsory measures; for when Elizabeth summoned her forces to defend her realm in the prospect of a Spanish invasion, she could obtain no more than 3000 cavalry.

Sir Anthony Fitzherbert says, in his "*Boke of Husbandrye*," "A husbande may not be without horses and mares; and specially if he goe with a horse-plough, he must have both his horses to droive, and his mares to brynge colts and to uphold his stocke, and yet at many times these may droive well if they be well handled." The roguery of horse-dealers was an early sin; for one of the old Cambrian laws provides that the purchaser of a horse shall have three nights to ascertain whether he is infected with the *staggers*, three months to prove his *lungs*, and twelve months to discover whether he is infected with the *glanders*. For every blemish not discovered before purchasing, if it was not in the ears or tail, one-third of the price was to be returned. (*Laws of Howell Dhu.*) The deceptions practised by the dealers in horses is still proverbial, and there does not appear with their fraternity to have been any intermediate stage of innocence, for, in his "Husbandrye," Sir Anthony Fitzherbert says,—"Thou grayser, that mayest fortune to be of myne opinion or condytion to love horses and younge coltes and foles, to go among thy cattle, take hede that thou be not beguiled as I have been a hundred times and more. And first thou shalt knowe that a good horse has fifty-four properties; that is to say, two of a man, two of a badger, four of a lion, nine of an oxe, nine of a hare, nine of a fox, nine of an asse, and ten of a woman."

Pigs have been amongst the usual animals fostered by the farmer in times at least as early as the Anglo-Saxons. In those days they were evidently the most numerous of their live-stock; scarcely an estate is mentioned without its being stated that it affords *pannage*, or mast in its wood, for such a number of swine. They were a very prominent part of their wealth, and indeed a chief necessary, for they were in winter obliged to use almost exclusively salted meat, and the great preponderance of woodland supported best this kind of stock. (*Turner's Anglo-Sax.*, iii. 22.) Heresbach is particularly earnest in recommending the pig; and after mentioning it as abominable to the Jews, says, with a boastful feeling that made him forget its impiety, "I believe verily they never tasted the flitches of Westphaly."

Such is a rapid sketch of the state of English agriculture previous to the days of Sir Anthony Fitzherbert, the first who wrote of husbandry and rural affairs in England. This great lawyer was the youngest son of Ralph Fitzherbert of Norbury in Derbyshire. He was educated at Oxford, and when called to the bar by the Honourable Society of Gray's Inn, "his great parts, penetrating judgment, and incomparable diligence," says his biographer, "soon distinguished him in his profession." He was made a sergeant-at-law in 1511, and was knighted five years afterwards. In 1523 he became one of the Justices of the Court of Common Pleas, "discharging his duty with such sufficiency that he was held the oracle of law in his time." He appears to have possessed the most undoubted courage, and the most uncompromising integrity. He was one of the very few who dared to oppose Cardinal Wolsey in the height of his power; and on his deathbed, at a period when all the favoured of the land were eagerly scrambling for the spoils of the Church of Rome, he solemnly warned his children on no account to accept of any of the sequestrated property of the abbeys.* He died on the 27th of May 1538, and lies buried in his own parish-church of Norbury, where, on his grave-stone of blue marble, was long to be seen the following short and modest inscription: "Of your charitie praye for the souls of Sir Anthony Fitzherbert, Knyght, one of the King's Justices of his Common Bench, and sometime Lo. and patron of this towne, and Dorothy his wife, daughter of Sir Henry Willoughby, Knyght, &c., which Sir Anthony deceased 27th May 1538." Of his great law works, by which he is so well and so honourably known to the law student, this is hardly the place to speak. His "Natura Brevium," and his "Grand Abridgment of the Laws," the great Coke has well described when he is speaking of the first in his Preface to his Eighth Report; and of the last says, "it is an exact work, and exquisitely penned." (*Preface to Tenth Report.*) In 1532 first appeared his "Boke of Husbandrye, very profitable and necessary for all persons;" and it is of this volume that I have chiefly to remark in this Journal.* It appeared first in small 32mo, and in that form was several times reprinted; afterwards it was published in quarto, and lastly in octavo. I am not aware of any recent edition of the work. Its original title was as follows: "The Boke of Husbandrye, vereye profytable and necessarye for all manner of persons, newlye corrected and amended by the auctor Fitzherbarde, wyth divers additions put thereunto;" and in the edition I have chiefly used in this memoir is subjoined, "Imprynted at London by John Walle, dwelling in Foster Layn, at the sign of the Hart's Heade;" and with nearly the same spelling, a similar edition printed by "John Marshe in Flete Strete, nere unto St Dunston's Church, 1548," small 24mo. This work is divided into four books, and is rather a curious collection and strange admixture of rural life descriptions, and advice for the prosperity of country affairs, than a set treatise on husbandry. The first part is entitled, in the edition of 1598, for the early editions were not divided into "Bokes," "Here begynneth the Boke of Husbandrye, and fyrste whereby husbondmen do lyve."

---

* This injunction his descendants adhered to with inflexible resolution. They have often been honourably distinguished in the ranks of literature, and in the public service of their country. The family was ennobled in 1801, when Alleyne Fitzherbert was created Lord St Helens.

It is evident that even in those days there were different kinds of ploughs used in various parts of England, for Fitzherbert tells us, chap. 3—

> "One plough will not serve in all places, wherefore it is necessary to have divers sortes." "In Somersetshire, Dorsetshire, and Glostershire, the share beam, that in many places is called the plow-head, is four or

---

* London, 1532, 8vo. Editions also of it appeared in 1534, 1546, 1548 (by Thomas Marsh), 1559 (by John Awdeley), and 1562, all in 8vo; many other editions appeared without dates. In 1767, 8vo, with a treatise of Xenophon's, and another book of Fitzherbert's on surveying.—*G. W. Johnson's History of English Gardening*, 49.

five foote long, made very broad and thinne, and that is because the land is very tough, and would sucke the plough into the earth, if the share beams were not very long, broade, and thin. In Kent they alter much in fashion, for there they goe upon wheeles, as they do in some parts of Hartfordshire, Sussex, and Cornewall. In some counties they will turn the shell board at every landsend, and plough all one way. In Buckinghamshire are ploughs of another fashion, and plough irons of altering shape, both which are more correspondent to my lyking than any other, and are fytte in general for most places, especially if the ploughe beame and share beame were four inches longer between the sheathe and the ploughe tail. Neither will I stand too strictly on their fashion, sith their is no county but custom or experience hath instructed them to make choice of what is most available, and he that will live in any countrie may by free charter learne of his neighbours, and howsoever any plough be made or fashioned, so it be well tempered, it may the better be suffered."

Our author was a decided advocate for the use of oxen in husbandry; a question which had evidently been much considered in his days, for he devotes his 7th chapter to the consideration of the matter, uses all the modern arguments in their favour for heavy soils, and told in conclusion his readers—

"If any sorance betide a horse, as old age, bruisings, blindness, or lameness, then is he worth nothing except for a kennell of noise-begetting hounds" (the learned judge was evidently no friend to the delights of the chase); "but if any mischief befall an ox, as age, bruise, or lameness, for ten shillings at any time, he may be fed, and then he is man's meat, and in that degree better than ever he was. These reasons and circumstances considered, I am of the poet's opinion that the ploughe of oxen is much more profitable than the ploughe of horses, to which the Holy Scriptures themselves condescend; for wheresoever it speaketh of husbandry, it entitleth the ox to his yoke for labour."

After telling the farmers of those days how they should plough all kinds of land "all tymes of the yeeare," he proceeds to inform them, in his 11th chapter, how they should sow their corn, and commences with an account of a seed which more modern agricultural treatises have rarely if ever mentioned.

"There is a seed called Discretion, if a husbandman have of that seede and mingle it amongst his other corne, they will growe doubtless much the better, for that seede will tell him how many casts of corn a land ought to have. And a young husband, or, it may so fortune, a man that by possibility might have grey-headed experience, hath not sufficient of that seede, yet he that lacketh it is lawfull for him to borrow of his neighbours that have, and his neighbours be unkind if they will not lende this young husband part of their seed, for this seede of discretion hathe a wondrous virtue, for the more it is eyther taken of or lent the more it is."

The use of saltpetre, and of rich concentrated organic manures, is evidently not so modern a practice in England as many of the advocates for letting improvements slumber unnoticed believe ; for, when speaking in his sixteenth chapter of " howe to make barraine grounde bryng forth good corne," he says:

" If thou wilt be assured that no corne thou sowest shall faile, then take saltpeeter and mingle it with thy corne, and sow it, and thy labour shall never be frustrate. For want of it take the blacke dregges of oil, and wet thy seed ere thou sow it, and it shall undoubtedly spring up. If thou hast none of these, then take pigeons' dung and mingle it with thy seed in the hopper, and sow it, though it be not so good as the other yet is the profytable virtue wonderful."

Fitzherbert saw very clearly, and with more wisdom than many cultivators of our own more enlightened days, the importance of paying the utmost attention to manures of all kinds. In chapter 19, he treats of " how to carry out manure or dung, and how to spreade the same." He there told the cultivators of the reign of Henry VIII.:

" Have regard your manure be layd upon small heapes neere together, and to spreede it evenly, and to leave no dung there as the great heepe stoode: for there the moistness of the dunge shall make the grounde ranke enough. And let not your heapes stande too long ere they be spreade, for if they do the goodnesse of your manure, chiefly if it take a shower of rain, will run into the grounde where the heape stands, and the rest when it is spreade will little profit."

And when treating of " the divirs kindes of manures," he observed, that " swine's dung breedeth thistles, but that the shovelings of roads is excellent, especially for barlie ;" and that " doves' dung for cold lande is best of all, but it must be spred very thinne. For groundes that are given to rive and chap, ashes is excellent, for they will binde and knit together."

The learned author's quaintly described views of the permanent improvement of the soil by earthy additions, are worthy the serious attention of modern cultivators.

" Also in Cheshiere and other counteys, they use for manure a kinde of blewe marble like earth, which they call marle. This is for these countries an excellent manure, and though it be exceedingly chargeable, yet through good neighbourbood it quittith the cost, for if you manure your groundes once in seven or twelve years it is sufficient, and looke how many yeares he beareth the corne, so many yeares he will beare grasse, and that plenty."

Fitzherbert, as I have noticed in another place, was evidently an honest, warm-hearted friend of the Church and of its too often ill-paid working ministers. He speaks with zealous abhorrence of those who in his days neglected, or only grudgingly paid their tithes; and he reminded the cunning tithe-withholding husbandmen of those days, that the prophet Malachi had adjudged to them "hunger and penurie" for their frauds in this way; "or, as heaven openning Saint Augustine sayth, give thy tythes truly, or els thou shalt fall amongst the tenth part of the angels that fell from heaven into hell."

The second book into which the work was divided, contains "the breeding, ordering, and usage of cattel, with whatsoever els appertaines unto them, and first of sheepe." In this he gives some excellent, plain, and practical directions for the breeding, shearing, washing, and curing of sheep when they are diseased. Speaking of "what thing rottethe sheepe," he says, first it is "the grasse called spearwoort."

"And another called pennygrasse, it groweth low by the earth in marsh grounds, hathe a leaf as broad as a penny or twopence, and never beareth flower. And also all manner of grasse that the land flood runneth over is ill for sheepe, because of the land or filthe that sticks upon it. All marrish ground and marsh grounds is ill for sheepe, salt-marshes only excepted: that grasse that groweth upon fallows is not good for sheepe, for there is much of it weede, and oftentimes it cometh up by the root, and that bryngeth earth with it, and they eat bothe, which is a great occasion of rotting. Also hunger rott is the worst rott than can be, for there is neither good flesh nor good skinne, and that cometh for lacke of meate, and so throughe hunger they eate such as they can finde."

The "thyrde booke" of Fitzherbert is upon planting timber trees, of which he was evidently enlightened enough to perceive the private and national advantages, "contayning setting, lopping, cropping, using of timber, grafting, and planting, with all manner of distillatyons, and whatsoever els appertaines unto any of them." There is much of this which the learned judge (who appears to have noted every thing he learned) certainly never intended to appear in a "Booke of Husbandrie," such as his chapters on the use of the cinnamon, cloves, pepper, and other spices, and his family receipts for "a balme" for taking away "any blemishe upon the skinne," curing wounds, and "an approved reciete for the gowte."

The "fourthe booke" is yet still more of a domestic nature, "contayning the ordering of a household eyther for noblemen, knight, or gentleman, and many other precepts and pretty rules as well for huswifry as husbandry." In this he directs how the steward, butler, cooke, yeoman of the wardrobe, usher of the stall, slaughter-man, clarke of the kitchen, and other servant, should be kept in order and honest, for he had evidently sundry suspicions that such gentry were in those days rogueishly inclined. Then he gives directions for breeding all kinds of poultry,—how many eggs should "be sette under your henne," and directs that the number should "be odde," either "fifteene or ninteane," according to the season. Then he has a short chapter on "howe to fatte your powltry," another "of the choyse of powltry," and several others on similar themes: and he actually believed that "swans, when they waxe olde, do declare the tyme of their own death to be neere approaching, by a sweete and lamentable note which they then sing." He let no occasion slip, however, to inculcate the excellent religious and moral feelings with which he was endowed: thus, in his chapter of general instructions "to all men how to thrive," he says—"I will desire the thrift expecting husbandman to rise early in the morning: according to the old saying, to rise early makes a man holy, healthy, and wealthy,* and to go about his closes, pastures, fields, and principally about by the hedges, and to have in his purse a pair of tables, and when he seeth any thing he would have amended to write the same down in his tables." All farmers in those days, however, could not write, for he adds—"And if the thrift covetting person cannot write, then let him nicke the defaultes upon a sticke and shew them to his baily." The good judge, amid his legal and agricultural observations, had also found time to detect the thievish propensities of his servants, for he adds—"And let him that will prosper have a watchful care both early and late, at all times, what manner of people resort and come to his house, and the cause of their coming, principally if they bring with them pitchers, or canns, or tankards, bottles, bagges, wallets, or bushell poakes: for if servants be untrue they may do infinite damage, and themselves little advantage, wherefore they would be well attended to."

---

* He adds in another place: "Experience of mine, and conference with the wise, hath taught me this truth, that early rising maketh a man whole and sound in bodie, quick in wit and memory, and rich in substance."

Towards the end of his work, he treats of the goodness of God, and the rewards offered to those who obey his will, in some short excellent chapters; in another, of the duty a man oweth to his neighbours; and throughout all his book, betrays a noble anxiety for the welfare of the husbandman. At the end of the edition of 1598, "Printed for E. White, and solde at his shoppe at the little north doore of Paull's Church, at the signe of the Gunne," is added:—"Thus endeth this ryghte profytable boke of husbandrie: compyled sometyme by Mayster Fitzherbarde, of charytie and goode zele that he bare to the weale of this mooste noble realme, which he dydde not in his youthe, but after he had exercysed husbandrie with greate experyence 40 yeres."

Such, then, was the spirit with which the first English author who treated of farming addressed the cultivators of the reign of Henry VIII., and such was the mode of cultivation that the early farmers of Britain adopted. To the modern agriculturist, a retrospective glance at the "oldenne tyme" will not only be an amusing, but at the same time not an unprofitable task. For the reflection must arise in the mind of such a reader, that strange improvements have evidently taken place in Britain since the days when Fitzherbert wrote, and the last Henry ruled; for then the land barely maintained a scanty population of not more than one-fifth its present number. To this mismanagement, it is true, several causes contributed. Feudalism, it must be remembered, was then only in the wane,—the abbeys had in their possession almost all the best lands in the kingdom,—property was insecure,—the government corrupt,—the king a profligate tyrant,—and the farmers, like many of their lords, exceedingly ignorant.

These facts, too, will also suggest the additional reflection, that such a gradual steady increase to the productions of the soil, as has evidently taken place in the last three centuries, yet offers no indication of ceasing to advance; but that, on the contrary, every succeeding season gives us still farther assurances, by some improvement or discovery in agriculture, that the skill of the cultivator in adding to the riches of the soil will most likely be fully equal to all the demands that can be made upon him by an annually increasing population, and that too for generations yet unborn.

THE AGRICULTURIST'S NOTE-BOOK.—NO. XIV.

Restraining Sand-drift.—The most striking improvements have been effected in reclaiming sand-drifted lands upon Lord Palmerston's estate on the west coast of Ireland, between the towns of Ballyshannon and Sligo. This is an object of much general interest; and has been effected by a very simple process, introduced by Mr John Lynch, his Lordship's resident factor at Cliffony. The tract of sand-hills upon this estate extends to many hundred acres. After unsuccessful attempts, it occurred to Mr Lynch to conduct the process of planting bent in this way. He took up portions of bent, *'Arundo arenaria,* from the numerous tufts or patches of it with which these waste lands were interspersed, and carefully thinned out the plants into bunches of one and a half pound each, preserving the roots as carefully as possible. These bunches were put in flat or fan shaped in holes in the sand made of a rectangular form, and beaten down with the foot so firmly as a little boy could not remove them with one hand. These rectangular holes are found to be much better than round ones, inasmuch as, when the bent is inserted in thick round bunches, they are apt to rot in the holes, and the fan-shape is more favourable for the bent throwing out its fibres among the sand. The plants are placed first on the side of the sandy ground next to the point from which the wind blows most prevalently, to arrest its drifting power over the rest of the ground. It may be that the drift may cover over the plants to the depth of two feet or more, in which case they will still penetrate through the sand; but it would be advisable to plant anew on the drifted surface until a fixed surface be established. The plants are put in at 2½ or 3 feet asunder. When Mr Lynch undertook the planting, part of the ground had been previously planted in rows of 15 feet asunder, and 4 feet apart in the line, which were found to be too wide either way; and had to be beat up with new plants, which created as much trouble as the planting of the whole ground anew.

In this way about 600 acres Irish, about 860 imperial, have been reclaimed, which now only require a little attention in replanting, in such places as have missed or which begin to blow. When the transplanted bent begins to *stool* or spread, it effectually checks the sand-drift, and the natural grasses came up in great profusion, such as white clover, bird's-foot trefoil, &c. So well has this simple plan succeeded, that upon a tract of the land in the neighbourhood of Mulloughmore, which in 1829 would not have supported a *goat*, now grazes 112 cattle and 200 sheep. Before these operations were commenced, the land had begun to drift across the mail-coach road, and had nearly destroyed four of the town-lands in the estate, which by these means have been saved.

Mr Lynch, in giving some directions for the use of an estate subject to sand-drift in Prussia, observes that bent seeds ripen about the latter end of July; that the bent should not be taken up till the latter end of September, and after that any time till the beginning of April; that it grows best when planted between the months of November and March inclusive. He remarks that the process of raising bent from the seed is tedious, as the plants will not be in a state for transplanting for three or four years. If the seeds are to be sown, it should be done in *clay* ground, mixed with sand from the sandhills, and used in a greater proportion than the clay or nursery earth. He further states, that from one cut of bent he has obtained 49 bunches, with which he has planted a perch of land, and he allows about 8 tons in this way to the acre,—Irish acre we presume.

The bent should not be planted at first in the driest or blowing places, but in the more moist or firm spots. After a few years it will spread so much that, with the saving and sowing of the seeds, a stock will be afforded for extending the planting every year. This method has been followed for some time on Lord Palmerston's estate, at the rate of 200 acres per annum.

If the bent were to be sent over seas for transplanting, it is directed to be packed in moss or grass, or, if in great quantity, it may be laid in the ship's hold with wheat or barley straw between every two or three courses of the bent, and in this way it would retain its vegetative powers for four or five weeks, or longer, in proportion to the care taken in packing it.

It is well known to what extent the land has been wasted by sand-drift in the confines of the Bay of Biscay, particularly on either side of the embouchure of the Garonne. This, like a pestilence, swallowed thousands of square miles of the coast lands of France, insomuch that in the beginning of the last century it arrested the attention of Government, and was ultimately stayed by one of its most eminent engineers, who, with the aid of troops of men, succeeded in planting a great belt of a particular kind of fir, *Pinus maritima major*, which has ever since checked the progress of the sand-drift, while it has clothed the sandy desert with wood highly useful for many purposes.

Lord Palmerston, impressed with the importance of this subject, has imported a considerable quantity of the cones of the *Pinus maritima major* from Bordeaux, which are now preparing in the nursery. Samples of the cones from France have also been presented to the Highland and Agricultural Society of Scotland. Even though this pine from the south of Europe may not fully answer expectations in our northern climate, it is confidently hoped that, by the patriotic exertions and example of Lord Palmerston, the extensive sand-drifts which are everywhere to be met with may be exchanged for grass lands or thriving wood of some sort.

The marran or sea-mat-weed, (*Arundo arenaria L. Ammophila arundinacea* of Host), employed by Mr Lynch, is the most frequent plant found in the sandy shores of England, Scotland, and Holland, and it is the best binder of sand-drift. The *Elymus arenarius* is perhaps the next best. The *Carex arenarius* the third best; and then the *Triticum junceum*, *Festuca rubra*, *Galium verum*, and *Trifolium repens*.

Reclaiming Bogs.—Besides restraining sand-drift, Mr Lynch has successfully reclaimed bogs on Lord Palmerston's estate. His plan and statement of expenses are these :—He begins by laying off about 50 acres of the bog, which are subdivided into four square portions of from 10 to 12 acres each, by belts of plantations. These belts are made about 3½ perches in breadth, including the fences. The fences consist of a ditch 5 feet wide at top, and 4½ feet in depth, and they answer the purpose of a main-drain, the materials out of them being cast up against the planted belt. A road is made round the 50 acres, which not only serves as a convenience for them, but as an outlet to the next 50 acres, which are fenced round as the reclaiming process proceeds. The tenant on each square field is thus surrounded with belts of planting, and has access to a road, an arrangement which prevents every inducement for trespassing on each other's grounds. The next process is draining the moss, levelling the holes in it, and then digging over the surface, which should be done at least one year before any crop is put into the ground. Where much of the bog has been cut away for fuel, the levelling the holes is an expensive operation, costing from L.2, 10s. to L.3 per acre; but the usual state of the surface would not exceed 10s. to level. In draining, the main drains, 5 feet wide and 4½ feet deep, are cut at from 60 to 80 yards asunder, according to the draining nature of the bog, and the power of the ground to discharge water. Under or covered drains, 2½ feet deep by 18 inches in width, are cut at 15 feet asunder and let into the main drains, and where the bog is pretty dry they may be cut wider apart. All the moss of bad quality should be drained gradually, such as the white, spongy, flow moss, that is frequently found on the top of more solid moss below, and which sometimes occurs to a considerable depth, that it may get time to consolidate by partial decomposition, which it will undergo the faster that it be not too quickly dried. This sort of light moss requires a heavy top-dressing of marl or limestone gravel, which are the best; but if not attainable, then clay, to the thickness of 4 inches, which should be immediately spread over the moss, and allowed to remain on it for six months. It should then be dug in. Upon the dug surface should be spread 100 barrels of rock-lime per acre properly slaked with water, and which should be well harrowed in, in order to mix it intimately with the moss and clay. Then 40 cart-loads per acre of sea-manure are to be put on, and, if that cannot be procured, 50 tons of dung, when covered in, render the ground ready for cropping.

The expenses of these several operations will stand thus:—

For cutting 25 perches of main-drains, 5 feet wide, and 4½ feet deep, at 7d. per perch, . . .	L.0	14	7
For cutting 208 perches of covered drains, 2½ feet deep and 1½ foot wide, at 1¾d. per perch,	1	10	0
Levelling the moss, on an average, . .	0	10	0
Ridging, which is much the same expense as ploughing, but better, on the average, .	0	18	0
For covering with clay, 4 inches deep, from 25 to 30 perches of clay, if easily dug out of clay-pits, and free of large stones, averaging 40 waggons a-day, and including about 6s. for removing the railroads, ...	7	1	0
For 100 barrels of rock-lime, delivered and spread on, at 9d. per barrel, . . .	3	15	0
For 40 cart-loads of sea-manure (dung will be more), say	4	0	0
Amounting per acre to . .	L.18	8	7

The details of the cost of claying may be seen by this statement. It will require nine men to attend on two waggons:—

Four men pushing out two waggons, at 9d. per diem, ...	L.0	3	0
Two men filling them with clay, . .	0	1	6
Two men spreading the clay on the moss, .	0	1	6
One man clearing the bearing of the clay-pit,	0	0	9
	L.0	6	9

According to these data, it will take 20 days to cover an acre, or 8 perches a-day, at 6s. 9d.,	L.6	15	0
Removing and laying railroads, . .	0	6	0
Total expense, . . .	L.7	1	0

The plantation-belts, to succeed well and become as soon as possible shelter for the square fields, should be managed in this way:—Let the moss be dug deeper than for cropping, as the roots of the trees require space to roam in, and which digging can be done for L.2 an acre. Then let four acres of clay be put on in the foresaid manner; and then lime and manure as before. Upon this dressing let two crops of potatoes be taken, and after these the trees will get up better in three years than if allowed to take their chance on the natural state of the moss they would do in seven.

In such situations, Mr Lynch recommends only the alder, Scotch fir, birch, and oak to be planted. The alder is the best nurse in exposed situations, and more of them should be planted than of any other kind. As larch grows very well in bogs, and is useful timber, a few of them might be planted, but not within the influence of the sea breeze. The number of plants in such belts should be 8000 to the Irish acre. This is no doubt an expensive mode of planting bog at the outset, but in the long-run it is the cheapest, and in the mean time it ensures against all failures. The potato crops will assist in repaying back part of the expense, and as the drains which enclose the belts answer the purpose of main drains for drying the moss, their cost should not be placed against the plantations.

This may be about the expense incurred by planting:—

For digging the moss, . . .	L.2	0	0
For covering it with clay 4 inches deep, say,	9	0	0
For 100 barrels of rock-lime, at 9d. per barrel,	3	15	0
For sea-manure or dung, . .	4	0	0
For 8000 trees of sorts three years old, once transplanted, at 15s. per 1000, .	6	0	0
For planting the same; two men will plant 1000 a-day, behind the spade, at 1s. 6d. per 1000,	0	12	0
Cost per acre for planting, .	L.25	7	0

The roads through the bog could be made by the railways conveying waggons carrying stones and gravel on them, if the distance of these materials is not very great, and spreading them 14 feet in width, at a cost of 10s. or 12s. per perch. But the cost of these roads should not be entirely charged against the improvement of the moss, as they become available to the tenants afterwards.

Some improvers are in the custom of sowing down bog with grass seeds, without either working or cropping it in the first instance, and then they imagine they have reclaimed bog. Mr Lynch is of opinion that bog in such a state is in no better a state than in its original condition, for unless the bog obtains from 12 to 14 inches of workable soil on the surface, in which the cultivated plants may grow and be supported, the original herbage will soon again reappear, and the cost that had been incurred will be thrown away. In 1837, Mr Lynch had 4½ acres of the worst portion of the bog, being the white spongy kind, sown with oats after the bog had been prepared in the way detailed above for the first time, and the crop yielded 406 stooks, 4 of which, when thrashed, gave 1¾ stone of oats to each stook on the average, which rate, over the whole, gives 720 stones, or 30 sacks 17 stones, of 24 stones each sack. The oats were of the best quality, and their colour was particularly fine. The covering of clay acounts for the fine quality of the oats.

The better quality of bog could be reclaimed at a cheaper cost than what is mentioned as having been incurred in reclaiming the flow moss; but now that this kind of bog is reclaimed, it will give no farther trouble than the clearing out of the ditches, to which expense all sorts of land are liable, and it will be getting better and better every year.

*Bees.**—The interesting publication of which the volume named below forms a part, is now so far advanced as to embrace the history, in a form more or less complete, of most of the principal departments of the animal kingdom. If the enterprising and intelligent publisher carry it on, as we trust he will, till it touch upon every branch of the widely ramifying tree of animated nature, the work will form the most copiously illustrated, most popular, and incomparably the cheapest view of the animal kingdom that has yet been laid before the public. We are anxious to bear our testimony to its general merits, because, although it has been several years in progress, we never have had occasion to allude to it in our pages, except incidentally. The greater number of the subjects of which it treats do not, of course, fall directly within our province : it is otherwise, however, with the honey-bee, the cultivation of which forms such an interesting and useful branch of rural economy, especially among cottagers. As we are of opinion, from what we have witnessed, that some of the modes of treatment which prevail are not the most judicious, and that a much more prolific honey-harvest would result from an improved economical management, it may be of advantage to lay before our readers some of the views on these matters advanced by the author of the volume in question, who has, for a period of thirty years, been an assiduous amateur cultivator of bees, and a close observer of their singular ways and instincts.

---

* **Natural History of Bees, comprehending the Uses and Economical Management of the British and Foreign Honey-Bee; together with the known Wild Species; being the 26th vol. of the Naturalist's Library, conducted by Sir William Jardine, Bart. Lizars, Edinburgh, 1840.**

Is it not a remarkable fact, that we should be indebted for the most important discoveries hitherto made in the mysterious economy of the hive-bee, to an individual who was *totally blind?* Such was the case with the celebrated Huber, a native of Geneva, who did not merely labour under imperfect vision, as some of his advocates have affirmed, but was deprived of sight altogether, from the period when he first applied himself to investigate the nature of these wonderful insects. Yet such was his indefatigable perseverance, skill in devising experiments, and good fortune in being surrounded with individuals who were both anxious and able to carry his suggestions into effect, that it is not without reason that his friend and biographer De Candolle affirms, that nothing of any importance has been added to the history of bees since his time ; and naturalists of unimpaired vision have nothing of consequence to subjoin to the observations of a brother who was deprived of sight.

It has always appeared to us, that one of the most remarkable circumstances in the natural history of bees is the power they possess of converting the larva of a worker into a queen, when they happen by any accident to have been deprived of the latter. The fact that such a conversion takes place has been demonstrated so clearly that it cannot be called in question; but it is not easy to understand how a change of food, and the occupation of a larger cell, should have the effect of producing so material a change, at once in function, instinct, and organic structure. It is true that we must keep in mind that the worker-bees are females of imperfect organization, and it is easy to conceive that a certain mode of treatment should cause a greater development of parts, the germ of which existed previously. But the change goes even farther than this, and there is a determinate alteration in certain parts of structure. If, then, we are to agree with Feburier, that the artificial queen acquires *no new powers*, we must at least admit, that she undergoes alteration in organic parts, such as in the feet, maxillæ, &c. which leaves the case as wonderful and inexplicable as before. "It would tend greatly to elucidate the subject," as has been judiciously remarked by a recent writer, 'if a series of experiments could be made at different periods of their development between the larvæ, nymphs, and perfect insects, of the two kinds of queen-bees, viz. those which were deposited originally in the royal cells (the legitimates) and those whose condition has been altered by the bees themselves, in consequence of a failure in the royal line (the citizen-queens). It has not yet been ascertained at what periods or in what manner these singular changes of form take place, further than that the common maggot or bee-worm, on which the change has to be effected, must not exceed the age of three days."

"The proceedings of the bees in order to supply the loss of their queen," says the author of the present volume in the Naturalist's Library, "are extremely interesting. In about twenty-four hours, they are aware of the misfortune that has befallen them, and, without loss of time, they set about repairing the disaster. They fix upon a worm not more than three days old, demolish the three contiguous cells, and raise around it a regular cylindrical enclosure. At the end of three days, the workers change the direction of the cell, which has hitherto been horizontal, into a perpendicular position, working downwards, till it assume the appearance of a stalactite. In due time it is sealed, and the larva undergoes its metamorphosis into a royal nymph. Huber gives a detail of some interesting experiments on this head, the substance only of which we can present to our readers. He deprived a hive of its queen, and put into it some pieces of comb containing worker eggs. The same day, several cells were enlarged by the bees, and converted into royal cells, and the larvæ supplied with a profusion of jelly. He then removed these worms from the royal cells, and substituted for them as many common worms from workers' cells. The bees did not seem aware of the change, they watched over the new worms as intently as over those chosen by themselves; they continued enlarging the cells, and closed them at the usual time. At the proper time, two queens were hatched, almost at the same moment, of the largest size, and well-formed in every respect. Nothing could be more conclusive than this experiment. It demonstrated that bees have the power of converting the worms of workers into queens, since they succeeded in procuring them by operating on worms not chosen by themselves, but selected for them."—P. 91.

Those who are desirous of witnessing these and the other marvellous incidents of bee-economy, may procure the means of gratifying their curiosity with less difficulty than they perhaps imagine. In ordinary straw-hives every thing is concealed from the eye, and with these it is, of course, impossible that either observation or experiment could be attempted. But much may be done by adopting wooden hives, of which various kinds are recommended by apiarians, having small doors opening in numerous places in the sides, which give a great command over the interior, and are, besides, attended with great advantage even when the hive is kept exclusively for its produce. Perfect facilities for observation, however, cannot well be obtained without using a glass hive, or one which is partially composed of that material. The author of this volume describes one (p. 180), the sides of which are composed of glass, separated by so small an interval that only a single comb can be constructed between them. This affords very great facilities for noticing the proceedings of the inmates, for, owing to there being only one comb, none of their operations can be concealed as in other hives. Neither are the bees, after a little experience, in any way disturbed by the presence of an inspector. The queen may be observed in all her movements, even in the process of laying the eggs. She may be seized and detained for any length of time, and the process of constructing royal cells watched throughout all their stages. In short, all the experiments that have ever been made may by this means be verified, and others of scarcely less interest and importance may be undertaken to illustrate what is yet obscure in the history of this female monarchy. A sketch of another hive, called Dunbar's experimental hive, is likewise given, and it seems to combine many advantages;

but as its construction cannot be readily understood without the aid of diagrams, we must refer for an account of it to the volume itself.

The process of swarming, which is always one of great interest to the bee-master, and not less so to the lover of nature, as affording an excellent opportunity of witnessing a striking development of the habits and instincts of this insect, is well described, after Feburier, in the following paragraph: —" The laying of the drone eggs having terminated, the queen, previously large and unwieldy, becomes slender in her figure, and more able to fly, and begins to exhibit signs of agitation. She traverses the hive impatiently, abandoning the slow and stately step which was her wont, and, in the course of her impetuous progress over the combs, she communicates her agitation to the workers, who crowd around her, mounting on her back, striking her briskly with their antennæ, and evidently sharing in her impatience. A loud confused noise is heard throughout the hive, and hardly any of the workers are observed going abroad to forage; numbers are whirling about, in an unsettled manner, in front of the hive; and the moment is come, to a considerable portion of the family, for bidding adieu to their ancient abode. All at once the noise in the interior ceases, and the whole of the bees about the doors re-enter; while those returning loaded from the fields, instead of hurrying in as usual, hover on the wing, as if in eager expectation. In a second or two, some workers present themselves again at the door, turn round, re-enter, and return instantaneously in additional numbers, smartly vibrating their wings, as if sounding the march; and at this signal the whole swarm rushes to the entrance in an overwhelming crowd, streaming forth with astonishing rapidity, and filling the air in an instant, like a dark cloud overhanging their late habitation. There they hover for a moment, reeling backwards and forwards, while some of the body search in the vicinity for a tree or shrub which may serve as a rallying point for the emigrants. To this they repair by degrees, and, provided their queen has alighted there, all, or at least the greater part, crowd around, and form a dense group, sometimes rounded like a ball, sometimes clustered like a bunch of grapes, according to the nature of the resting-place they have fixed on. The queen is not always foremost; it is frequently, or rather generally, not till after the departure of a considerable number of workers that she makes her appearance; and when she does come, it is with a timid irresolute air, as if she were borne along, almost against her will, by the torrent that streams out of the hive, for she often turns on the threshold, as if about to re-enter, and frequently does so, but cannot long resist the opposing crowd."—P. 138.

The selection of a spot for the swarm alighting upon, generally a shrub or low tree in front of, and not far distant from, the hive, has much the appearance of being the result of mere accident; but many distinguished naturalists are of opinion that it is fixed on beforehand, and all the movements; even when they extend to a great distance from the place of starting, predetermined. For this purpose, some days previously to swarming, they send out some of their number in the character of *scouts*, to look out for a suitable habitation, and pioneer a way for the general body. Although this statement has been called in question, there are numerous appearances which countenance it; and it is quite in harmony with the general care and foresight which these creatures evince on other occasions. It would hardly be consistent with the reputation which they have acquired for these qualities, if they were to leave their old abode without any preparation for the future, at a time, too, when their precious queen-mother, the object of so much solicitude, is exposed to the elements, and might encounter many dangers before finding a suitable place for her reception. If the supposition be correct, that a retreat has been chosen, we must consider the shrub or bush on which they first alight as intended merely for a rallying point, before they undertake their final flight. It is probable, however, as our author remarks, that this precautionary measure is not always taken, otherwise it is not likely they would submit so readily to be intercepted by the bee-master, and remain contentedly, as, in ninety-nine cases out of a hundred, they do, in the hive in which he has placed them. It may be admitted, that there is every likelihood that their habits, in this particular, have been greatly modified by domestication. When they happen, while in a wild state, to change one abode for another, we have no doubt that their new residence is in every case determined before the withdrawal of the queen from her former shelter.

It is much to be regretted that *artificial swarming* is so little practised, and so little understood, throughout the country. It is one of the greatest improvements that could be introduced into bee-husbandry, and, in many cases cannot be dispensed with, if it be desired to reap the full benefit of the stock. It prevents the necessity of watching, does not expose the artificial colony to casualties, and secures the multiplication of swarms. Unfortunately, the operation is not easily performed with the hives commonly in use, except by an individual of considerable practical skill; but were its importance properly appreciated, hives might easily be introduced which would render it quite simple. "With such a hive as Huber's, or any other square-shaped hive that opens in two parts vertically, the operation is very simple, more satisfactory, and less dependent on contingencies. Let a hive be prepared of precisely the same dimensions as the one to be operated on, and of the same construction, namely, opening vertically into two halves. Early in the morning, or in the evening, when the bees are all at home, let the hive be gently separated. The bees, always most irritable when idle, will dart out in no placid humour, and must therefore be kept from annoying the operator by the use of smoke. Apply to each full half an empty one, carefully fastening them together by hooks and eyes previously arranged. We have thus two hives, each half full of bees, brood, and honey. One of them will possess the queen, and the other will have royal brood, or, at all events, eggs and larvæ of all ages, wherewith to originate a queen. As soon as they have recovered from the panic caused by the operation, and have all retired into the interior, let both doors be closed, that there may be no communication between the two divided communities. Two or three hours afterwards, listen attentively to each, and it will be readily ascertained, from the quiet state of the one, and the loud disorderly buzzing of the other, that the queen is present with the former, and that the other is distressed at the discovery of their loss. Carry off the one with the queen, and shut it up in a dark apartment for twenty-four hours, leaving the other in the original station. If this last had no royal brood at the time of the separation, it will, within twenty-four hours, have set about forming an artificial queen, and the operation is finished."—P. 212. The proper period for the above operation, is about eight or ten days previous to the time when natural swarms may be expected.

Another important improvement in the cultivation of bees, would be the substitution of a system of depriving them annually of only a portion of their honey, leaving the insects uninjured, in room of the barbarous but almost universal practice of destroying them by smoking. Not to insist on the inhumanity of unnecessarily sacrificing the lives of creatures which we have long watched with anxiety and contemplated with admiration, it is not difficult to shew how much greater a produce results from the conservative than the destructive system. Although the latter yields a greater return in the first instance, the former in a short time becomes more than doubly productive. "Suppose two apiaries," says our author, in illustration of this fact, "each containing five stock-hives at the end of July, exclusive of as many swarms recently thrown. The owner of the one, practising the depriving system, takes from each of his stocks 10 lb.

of honey, making an amount of 50 lb. as his honey harvest. The owner of the other, an abettor of suffocation, proceeds in September to smoke his five old hives, and receives from each 25 lb. of honey, making an amount of 125 lb. as his honey harvest, between two and three times the quantity of the other. In the following year, the depriver has his five old stock-hives, and the five swarms now become stocks also; from the whole ten he now takes 100 lb. of honey, while, at the same time, his apiary is augmented by the addition of ten new swarms, making twenty for the following year; while his rival possesses only his former number of five, yielding 125 lb. In the next year, that is, two years from the commencement of the comparative trial, the depriver has twenty stock-hives yielding 200 lb., and so on, in geometrical ratio, while the other remains at his original 125 lb."—P. 224. Various modes of effecting this deprivation are recommended by apiarians, and several of them are attended with very little trouble.

There are other points, in the mode of managing bees, which it might have been of advantage to bring under the notice of our readers, as material improvements on the methods now generally followed; but for these we must refer to the volume itself. Those we have alluded to, namely, artificial swarming, deprivation, and the abandonment of the unnecessary practice of suffocation, are of primary importance, in an economical point of view; and, if generally acted upon, would make the cultivation of bees a much more easy and agreeable task than it is at present, would interest the operator much more strongly in the ways and instincts of this singular insect, and at the same time greatly increase the amount of his honey harvest.

*Dogs.**—We are glad that the interesting subject of the natural history of dogs has been taken up by an individual so well qualified to handle it as Colonel Hamilton Smith. There is scarcely any other naturalist in Britain who has devoted so much attention to certain tribes of quadrupeds, particularly those more directly subservient to the interests of the human race. During his travels in many different quarters of the globe, he has availed himself of every opportunity of collecting information, and making drawings of rare species, whether found in a state of nature or preserved in museums. The collection of zoological drawings thus accumulated, is, we believe, one of the most extensive in the country; and the portion of them relating to the Canidæ (the dog and its allied species) has afforded the materials for the present volumes.

---

* Natural History of Dogs. By Lieut.-Col. Charles Hamilton Smith; forming the 25th and 26th vols. of the Naturalist's Library.

Colonel H. Smith enters at some length into the discussion of the difficult question relating to the origin of our domestic dogs; and comes to a somewhat different conclusion from many recent writers on the subject. It is well known that very different opinions have long been held by naturalists on this point. Linnæus included the whole of the domesticated kinds under the name of *Canis familiaris;* Buffon viewed the shepherd's dog as the original species from which all the others had sprung; Cuvier, in his *Regne Animal*, regards the species as distinct, remarking, at the same time, that the "taming of the dog is the most complete, the most useful, and the most singular conquest man has achieved, the whole species having become our property." A wild dog, named the Buansu (*Canis primævus*), inhabiting the central region of the old world, whence many of our most ancient elements of social existence seem to have emanated, has been pointed out as the primitive species of the whole canine race. A jackal (*Canis Anthus*, F. Cuv.) is shewn by Professor Kretschmer to resemble so closely the antique carved and painted figures in the Egyptian temples, and a skull taken from the catacombs of Lycopolis, that there scarcely can be any doubt but that it is the type of the dogs of ancient Egypt. Mr Bell, in his recent work on British Quadrupeds, advocates the claims of the wolf to be considered the progenitor of our domesticated races; and there are other modern writers who concur with him in this opinion. Colonel Hamilton Smith adduces numerous considerations in opposition to this view, and concludes by affirming his belief, that "There are sufficient data to doubt the opinion that the different races of domestic dogs are all sprung from one species, and, still more, that the wolf (*Canis lupus*) was the sole parent in question; on the contrary, we are inclined to lean, for the present, to the conjecture that several species, *aborigine*, constructed with faculties to intermix, including the wolf, the buansu, the anthus, the dingo, and the jackal, were parents of domestic dogs. That even the dhole or a thous may have been progenitors of the greyhound races; and that a lost, or undiscovered species, allied to *Canis tricolor* or *Hyæna venatica* of Burchell was the source of the short-muzzled and strong-jawed races of primitive mastiffs."—Vol. i. p. 104.

After considering the general structure of the canine family (co-extensive with the Linnæan genus *Canis*), which is an extremely natural one, the osteology and whole anatomy of the species being surprisingly similar, the author first describes and figures the wolves, regarding which he supplies much accurate and interesting information. Lyciscan dogs (Gen. *Lyciscus*), including the Prairie wolf of North America (*L. latrans*), and the Caygotte of Mexico (*L. cagottis*), as well as the red dogs (*Chryseus*), next pass under our review. The latter group comprehends the Dholes, the Pariah dog, and the New Holland dingo. The dingo occurs in a wild state all over Australia, but an inferior breed is partially tamed and occasionally used for hunting kangaroos and emus. These canines are entirely mute, neither howling, barking, nor growling. They do not run like dogs, but carry the head high, the ears erect and turned forward; and we are assured by Cunningham, that whenever domestic dogs fall into their power, they are immediately devoured. It has been usual to consider this and other diurnal canines similarly circumstanced, as feral dogs (*chien maron* of the French), that is, dogs returned to a wild state after they or their progenitors had been domesticated. Col. Hamilton Smith is inclined to regard them as in their aboriginal condition, since they indicate no tendency to assume the distinctions to which, if they were descended from wolves or jackals, they must have returned.

After alluding to the various names by which jackals are domesticated in the East, the author gives the following account of their manners :—" They form a group of crepuscular and nocturnal canines, never voluntarily abroad before dusk, and then hunting for prey during the whole night; entering the streets of towns to seek for offals; robbing the hen-roosts, entering out-houses, examining doors and windows, feasting upon all dressed vegetables and ill-secured provisions, devouring all the carrion they find exposed, and digging their way into sepulchres that are not carefully protected against their activity and voraciousness; and, in the fruit season, in common with foxes, seeking the vineyards, and fattening upon grapes. They congregate in great numbers, sometimes as many as 200 being found together; and they howl so incessantly that the annoyance of their voices is the theme of numerous apologues and tales in the literature of Asia. Their cry is a melancholy sound, beginning the instant the sun sets, and never ceasing till after it has risen. The voice is uttered and responded to by all within hearing, in a concert of every possible tone, from a short hungry yelp to a prolonged crescendo cry, rising octave above octave in the shrillness, and mingled with dismal whinings, as of a human being in distress. Jackals retire to woody jungles and rocky situations, or skulk about solitary gardens, hide themselves in ruins, or burrow in large communities. If by chance one of the troop be attacked, all are on the watch, and, if practicable with self-preservation, issue forth to the rescue. The Indian wolf and hyæna occasionally avail themselves of their burrows, but while they occupy these retreats, they abstain from hostility with their neighbours. In the Moslem dominions they remain entirely unmolested, but in British India they are occasionally coursed with greyhounds, or hunted with fox-hounds, and having a strong scent, are readily run down, unless they can regain their earths, or mislead them in the jungles. Nevertheless, when at bay, the jackal fights so desperately, and his snap is so severe, that it is usual to have them destroyed by terriers. They unite the cunning of foxes, and the energy and combination distinguished in the best trained dogs, with a tenacity of purpose surpassing both. When overpowered by superior force, and resistance is vain, they affect to be slain, and be simulating death; but if they be thrown into the water while in this state, they swim immediately. They emit a very offensive smell, not totally obliterated even in a domestic state, when they have been fed for a considerable period on rice plantations, and other vegetables, as is usually the practice with the native Indians. Although, when in captivity, they know and will follow their master, they are far from being tractable, or to be depended upon. They associate readily with dogs, and hybrid offspring is not uncommon; nor is there a question that their mules are not again prolific."—Vol. i. p. 210, 212.

It was long a mistaken notion that the jackal was in the habit of preceding the lion or tiger, and by means of its superior powers of smell indicating the spot where prey was to be obtained. Had such been the fact, it would have formed a singular exception to the general rule, for Nature appears to have implanted an innate hostility between the canine and feline tribes, which prevents them ever standing, while in a state of nature, in such friendly relations to each other. The truth is, that the jackal does not precede, but follows, at a safe distance, evincing his hostility by continually pursuing lions and tigers during the night, and announcing their approach by a peculiar cry of warning, to which no other animal is heard to respond; while at other times, the cry of one is answered in every direction, by all the individuals within hearing.

The greater part of the second volume of Colonel Smith's work is devoted to the dogs, properly so called, and contains an interesting history of all the more important breeds, including all the kinds with which we are so familiar. He likewise enters at some length into the consideration of the breeds as known to the ancients, a subject of somewhat difficult investigation, but full of interest, both as illustrating the changes which the various races have undergone, and as throwing light on many passages in the Greek and Roman classics.

As a specimen of this portion of the work, we subjoin the following extracts. "Of all carnivorous quadrupeds, dogs possess the greatest variety of modulations in their voices;* they bark, bay, howl, yelp, whine, cry, growl, and snarl, according to the emotions they feel. When encouraging each other in hunting, expressing the language of authority; in watchfulness, at distant noises, or displeasure at particular sounds, in pain or suffering, they have an expressive moan; a guttural or tremulous squeal, under impatience; a snarl, in anger; and a kind of shriek, when their passions are excited to ferocity. Who is there so little observant as not to know, almost by the sound of the first note, the peculiar bark of the drover and shepherd's dog, half intonated, as the expression of delegated authority, and understood by the flock or the drove, the more earnest repetition when the first signal is disregarded, followed by the low and bluff sound, conveying a menace, and at length the sharp snarl, when he finds it necessary to enforce obedience, by running to the spot, and execute his orders with well-counterfeited anger; or, if disappointed, the half howling bay of lamentation at the failure? All these emotions are expressed in a language which marks the singular endowments bestowed by the Creator's fiat, for purposes that cannot well be mistaken, nor be studied without calling on our sympathy and affection. Dogs, likewise, express most significantly, by the voice, their desire to be admitted within doors, and still more in begging with perseverance; or, in resentment, when treated with contempt. They are jealous of their master's favour, quick in discovering the respectable, insolent to the poor, selfish in gormandising, tyrannical among their meaner inferiors, and fawning upon their superiors; injury they resent with the discretion and pertinacity of politicians."—Vol. ii. p. 83.

The sagacity of the canine species, their benevolent feelings, prescience of impending danger, instinctive comprehension of the nature of property, fidelity, &c. the author illustrates by numerous striking anecdotes, several of which had not before fallen under our observation. For these, we must refer to the volume itself. Under the head of "Pointer," we find the following remarks:—"In their present qualities of standing fixed and pointing to game, we see the result of a long course of severe training;

---

* As a singular proof of this, we may mention the singular case communicated to the French Academy of Sciences, by the celebrated Leibnitz, of a dog who had been taught to modulate his voice, so as to be able to repeat intelligibly the words required to ask for coffee, tea, and chocolate!

and it is a curious fact, that, by a succession of generations having been constantly educated for this purpose, it has become almost innate, and young dogs of the true breed point with scarcely any instruction. This habit so firm in some, that the late Mr Gilpin is reported to have painted brace of pointers while in the act, and that they stood an hour and quarter without moving. These dogs were named Pluto and Juno, were the property of Col. Thornton. Dash, another pointer belonging to the same sportsman, was sold for L.160 worth of Burgundy and Champagne, one hogshead of claret, an elegant gun, and a pointer, with the proviso that if an accident should disable the dog, it was to be returned to the Colonel at the price of L.50 !"

Apple-Gathering.—We have long been of opinion that a great error is committed by persons in general, in gathering their apples for winter store before the fruit is sufficiently matured ; also that it is unwise to make a general gathering, instead of effecting the operation by degrees and in detail—according to the kind of apple—whether more or less hardy, of an early or late sort, a short or long keeper, &c. In other harvestings, judgment is exercised : one species of pea ripens later than another, and is left longer to mature ; one variety of wheat is garnered before another is ready for the sickle ; one sort of potato retains its haulm green to a later period than another, and is allowed to remain longer in the ground,—and, without doubt, wisdom and experience dictate the operation ; but in an orchard of winter apples, no matter how many sorts form the store, how various their kinds, nor what state of maturity the fruit, *all* are taken from the trees, although from some the leaves are falling fast, and on others they should not be off till the middle of December.

We can adduce better authority, however, than mere opinion ; we have results of our own experience to vouch for the correctness of the foregoing remarks. During the early part of the winter of 1839, that is, in the month of December, after the trees had been laid bare of their leaves, a peck or two of apples of a keeping sort were discovered, which had undesignedly been overlooked ; they were gathered, and in fine condition, the bulk of the crop having been housed five or six weeks, and undergone the process of heating and "sweating," which are supposed to be essential preliminaries to their safe keeping. Those off the same tree were yellow, looked shrunk and shrivelled, and in flavour had become, by comparison, rank and coarse; while, to our surprise, those of the newly culled portion of the crop were sound, hard, firm, full, juicy, *not mellow*, and with all that freshness of flavour and texture which is never to be found in an apple that is not recently plucked. We regretted, then, that for so many years we had followed in the wake of others, and had not exercised a little judgment and discrimination, since it was evident that to suffer them to hang longer would be an advantage hitherto unimagined.

Having purchased our experience, we have, this last season, retained every kind of apple *and pear* (though contrary to the received opinion respecting the propriety of early culling this latter fruit) nearly a month later upon the trees, in many cases until the leaves had entirely left them; and we have found the results to be such as we anticipated. Every species is in better condition than we have ever known.

On a young tree of that now rare sort, the old English Nonpareil, we purposely left four beautiful apples throughout the late month of December, intending to gather them in the first week of the present year. They remained sound and unchanged during the severe frost of nearly three weeks, and anticipations of success in our experiment were sanguine,—when, on proceeding into the garden, on the 2d of January, for the purpose of realizing them, we found a few remnants of their skins under the tree; the half-famished blackbirds (of which flocks frequented the orchard to devour the remains of the autumn windfalls) had grown bold with hunger, made an incursion into the garden close to a vinery, marked our nonpareils for their own, and demolished the fruit and the experiment.

Every scheme for keeping apples we have made trial of for many years, and put ourselves to an infinity of trouble in order to ascertain the best: we have "shelf't" them; buried them in the earth like potatoes; laid layers in sheets alternately of apples and straw; spread them on the floor of a loft separated from one another, with an unglazed window which admitted freely the "winter's flaw;" tried that of covering them up in bran; also in fine dried white sand; warmth in closets; cellar temperature; total darkness; leaving them in heaps to sweat; storing them immediately from the trees; wiping and looking over, and removing all those which were specked, every week; packing in barrels with a linen covering over them, to abide the alternations of frost and thaw, as is the practice in America; and, after all, have arrived at this conclusion, that very little trouble is requisite, if caution be exercised in gathering them, that they may not be bruised: they should then be laid in heaps for a few days in an airy spot, a barn floor for example, and afterwards packed in chests, barrels, &c.; and if care be taken to look them carefully over at the time of storing, no other attention will be requisite, excepting that, once or twice more in the course of the winter and spring, the same attention should be repeated: of course they must be kept secure from frost, and no *English* linen cloth will suffice for this desirable end.

To those persons who may intend to purchase young trees of the most useful kinds, and who may not have "Lindley's Orchard," or other book to consult, and who are so unfortunate as to possess no opinion of weight on which to rely, and are therefore compelled to trust to the recommendation of a nurseryman, it may not be unacceptable to meet with a few names of apples suitable for all seasons, of which we can speak from experience in unqualified praise.

First, that most elegant and delicious apple the Hawthornden.—The next that ripens and is fit for all purposes, is—the Keswick Codlin. Then follow Caraway Russet. Golden Pippin. Downton Pippin, a most lovely little fruit of a shape and colour unequalled, keeping until January, and, although so full a yellow, far more mellow. Norfolk Beaufin (Biffin), fine, firm, juicy, and large, fit for all purposes, of a very deep red purple hue, and celebrated for a local purpose, though meriting general culture. Nonpareil. Downton Nonpareil. Downton Russet, small, and delightful when baked in the months of March and April. Winter Pearmain. Scarlet Pearmain. Golden Hervey. Downton Gilliflower. Ribston Pippin. French Crab. Here are fifteen kinds, quite sufficient in number and various in qualities for any private garden, and certainly of the highest merit. Those with Downton attached to their appellation have been raised by the late Mr Knight, President of the Horticultural Society, and sent by him to us. We therefore can attest the excellence of those which we have named.[*]

---

[*] As the methods of keeping apples by the ancients differ from those in present use, it may not be unamusing to our readers to let them hear the

Rotation of Crops. By Mr Towers.—The review of "The Four-Course System of Husbandry," by Mr Milburn, serves aptly enough as a precursor of those remarks on rotations of crop which form the subject of this communication.

It will speedily be seen that I claim little of originality, inasmuch as it is my object to refer to the evidence of others, in order to induce comparison of facts; but, before I proceed further, it appears desirable to render Mr Milburn's detail of the four-course Norfolk system a little more complete by ma-

---

directions given by one of the writers of the Geoponika, as translated by Owen in his Agricultural Pursuits, vol. ii. p. 19. "Apples, when gathered in a state of perfection, keep during a long time; but it is proper to gather them carefully with the hand, that they may not be bruised; and it is proper to wrap them in sea-weed, that is, in sea-moss, so that they may be thoroughly covered, and to lay them in fresh pots, that is, in pots that had not been burnt, and to lay sea-weed between the apples, that they may not touch each other, then to stop the pots. It is also proper to place them in an upper room, and one that is cool, free from smoke, and from all unsavoury smell. But if there is no sea-weed, you are to lay every apple by itself in small pots that have not been burnt, and you are to lay them up when you have stopped them. Some, indeed, having covered each apple with potter's clay, dry it, and lay it up. Apples will be preserved having their genuine flavour when the leaves of the walnut-tree are strewn under them; for they contribute much to the goodness of their colour, and to the excellence of their flavour. But you will do better, if, having wrapped each apple in walnut leaves, you lay it up. You may keep apples, if you lay them in pots that are internally covered with wax, stopping them with care. Apples also laid in barley keep sound. You will also keep apples thus:—Take an earthen vessel that is not pitched, with a hole in the bottom of it; fill it with wholesome apples that have been hand-gathered, not grown old; and having well covered the vessel with rock or wild asparagus, or with something else, hang it on any tree, and let it remain during all the winter, and the fruit will remain as it was put in; and I have learned this from experience. Apples are also thus preserved:—Wrap each apple in dry fig-leaves, then cover them with white potter's clay, and lay them up when dried in the sun, and the apples will remain as they were put in. Apples thrown into must will keep, being preserved by the lees, and they will preserve the wine and make it a sweeter flavour, to every body's astonishment. Being also laid in a new pot, and the pot being put into a wine cask, so that they may swim, and the cask being stopped, they will be quite fresh, and the wine well flavoured. They are also laid in baskets with clean locks of wool, and are preserved; and the winter apples were best kept in seed[*] in which grapes are kept. Smear the extremities of the apples with the juice of green satyrion,[†] and they do not decay." Such are the various methods of keeping apples 2000 years ago. Will any modern orchardist try any of them?—EDITOR.

[*] Pliny says they were kept in the seed of the millet. See Palladius, iii. 25.

[†] Two species of this plant grow upon the Alps, and one near Verona. It is described by Matthiolus, iii. 126.

king the reader acquainted with the method of manuring practised on the noble lands of Holkham; and this I am enabled to do by copying, almost *verbatim*, a letter received a few years since from the venerable nobleman, the father of husbandry, then Mr Coke; I had occasion to consult that excellent gentleman on the subject of his application of *fresh* manure, in which I conceived the late Sir H. Davy had erred, and was honoured by an immediate reply. This letter is now before me; in it, however, are marks of extreme rapidity and contraction of words, which render the perusal an affair of no little difficulty, and may lead to some trifling error. It thus proceeds:

"All the manure made in the separate yards is carted out during winter, as opportunities offer, into the fields intended for turnip, calculating the quantity at ten loads per acre. In the first instance, I make a platform of earth, and then cart over it a proportion of cow-dung, which I deem to be the weakest manure; upon that pig, which I hold to be the best; then comes the store and fold litter, followed by horse-dung; then some of the pig, always compressing the heap by carting over it; and then I plough round it and throw a slight coat of earth over the top and sides to keep it from fermenting. It remains in this state till within a fortnight of sowing my turnips, when I turn it over, and in its fermented state it is put into the split ridges of 27 inches, then turned over with the plough, and the seed sown immediately after it. *This process I have found to answer my most sanguine expectations for upwards of sixteen years*, upon a scale of not less than from 300 to 400 acres per annum. Sir H. Davy, who frequently honoured me with his company at my annual sheep-shearing, *strongly recommended fresh dung* out of the yards; but this I did not find answer, the other has never failed me for turnips, and it carries me round the four-course shift without any additional manure. Yours, &c. T. W. COKE."

By the careful perusal and appreciation of this most estimable document, the reader will be able to complete the line at p. 385, which now reads,

"*1st, Turnips* (manured) *consumed upon the land.*" The parenthesis I have filled up, and thus perfected the detail of the "*first course.*"

We have now to turn our attention to that peculiar order of rotation, which is described very minutely in an article (XLI. of No. 4, Journal of the Royal Agricultural Society) "*The Mode of Cultivation of Stinchcombe Farm.*" Of this I must extract merely the leading points, referring the reader to the article itself, and to the judicious remarks upon it by the Rev. Mr Rham.

" Stinchcombe is occupied by a Mr Dimmery; it comprises about 400 acres, half under grass (the meadow grasses) and half arable; the soil of the greater portion being of a good friable texture, partaking of the nature of the subsoil, or lower oolite on which it rests, and well calculated for the production of barley and oats, it is neither too strong and adhesive for turnips and potatoes, nor too light and soft for the production of wheat under proper culture; it is about 16 miles from Gloucester, 25 from Bristol and Cheltenham."

By the above description, one would conclude that the staple is a mellow loam, resting upon a species of granular freestone rock, for oolite is such. " One of the purest examples is the freestone of Kettering in Northamptonshire; the Bath freestone is another example, where the grains (often hollow) are connected by interposed calcareous matter." Portland and Lincolnshire freestone, are cited as specimens of oolite, differently cemented. We have lately heard much of agricultural schools and colleges, and if ever a tissue of lax disjointed facts, in the most important pursuit of life, called for efficient regulation, we have only to refer to all the descriptions given of soils, to procure evidence that nothing is really known or correctly described.

Agriculture is a science, and a noble one, but unless the great ones of the land, the powerful and influential societies —we would prefer to say—the Government itself, take up the cause, and institute agricultural colleges in *many parts* of the United Kingdom, wherein land in the large way, its geological and chemical characters, shall be tested by accurate experiments, and its powers of rotation practically ascertained, ambiguity and doubt will continue to embarrass every operation of the farm, and render every attempt at description nugatory and illusive. At the very first opportunity, I hope to resume this more important consideration; at present I only add, that we are no more able to understand or appreciate what the land of Stinchcombe farm really is, from the passage I have quoted, than to delineate the true features of a landscape from

the perusal of a written description of it; and until we *understand a soil*, we can never know its capabilities.

"ROTATION.—The production of the largest crops of the best edible potatoes, and at the least possible expense, being the principal object, Mr Dimmery adopted the following course, which he has found by upwards of forty years' experience to answer best. The first year he takes *Turnips;* the second, *Potatoes;* the third and last year of the course, *Wheat.* About one-third of the wheat stubble is sown in winter vetches, which are eaten off the ground by sheep, and, as cleared, it is prepared for a late crop of turnips; so that the *whole* of the wheat land is under turnips the following year. The turnips are all consumed by sheep folded on the ground in the usual way. After the turnips, *potatoes* are planted on the *whole* the next year. To this rotation most farmers would object, as a crop of barley might be taken between the turnips and potatoes, and also from an absence of a crop of clover in the course; but it will be seen in the detail that, in this course for twelve years, there are four crops of wheat and four crops of potatoes, both of which are the most valuable articles a farmer can produce from the soil, and only four preparing or fallow crops.

"The land is always kept in the best state of culture, and its productive power is never diminished by any of the crops which are taken, nor does it require, in any one year, additional labour to clear it from weeds."

"*Vetches.*—Soon after the wheat is harvested, the stubble is cut and carted off the ground before the potato harvest is begun. About twenty acres, or one-third part of the wheat stubble, is prepared for winter vetches. One ploughing only is necessary, and about three bushels of vetches to the acre are sown broadcast, and the ground is well harrowed to cover the seed. About 340 ewes, 340 lambs, and 170 wethers are generally put on this about the second week of May (it is shut up from stock during the winter and spring months), and are kept upon it till the first of July, or till the crop is all consumed. This amounts to about seven weeks' keep for a flock of 850 sheep, or at the rate of five or six sheep per acre per annum, which may be said to be free of all expense beyond the cost of the seed, as the land does not occasion more expense in preparing it for the turnip-crop than if it had not been sown with vetches; and the manure left by the sheep, with what additional dung can be procured, always produces a good crop of late turnips."

"*Turnips.*—As soon as the wheat stubble is all carried off the land, the sheep are brought from the pasture land where they are fed by day, and folded on the land intended for turnips. Mr Dimmery prefers to fold before ploughing, as the sheep lie much drier on it. As soon as the teams can be spared, that part of the turnip-break intended to receive the stable-yard manure is ploughed, as is that folded for sheep as it becomes ready. The second ploughing is generally performed in February and the early part of March. To pulverize the land further, and to bring it to good tilth, the roller is frequently used after the land has been ploughed, and before the drags are applied it is always rolled to break down or bruise the furrows that they may have greater effect, and reach the bottom of the furrows; and when the land drags up in lumps, it is again rolled before the second dragging. This is the most effectual method of completely pulverizing the soil; and the *harrow* is seldom used on this farm except to harrow in the turnip-seed. When the land is properly prepared for the crop, all the dung that can be collected is carted on it, and is ploughed in with the last furrow; that for *Swedes* in May and June, and for the others in June and July; that which was in *vetches* as soon as it can be got ready after they have been consumed by the sheep. The whole is generally finished about the middle of July. The turnip-seed is always sown broadcast, and the whole is consumed by sheep on the ground, which are folded in the usual way, receiving along with the turnips a sufficient quantity of hay from the grass-farm. The sheep are generally on the turnips from the end of October till the end of the following April. All the land is manured either by the fold, the dung carted from the yard, or by the consumption of the crop of vetches by the sheep." —" The expense of this crop may be reckoned at three ploughings, two rollings, five draggings, and two harrowings, besides carting all the manure on the farm. The land being always clean, the crop of turnips never fails. They are universally a good crop: the 66 acres are equal to keep from 16 to 20 sheep per acre from the end of October to the end of April."

Cabbage Plants.—This is a new feature, and though the extent of land employed be comparatively trifling, the object effected is of no little importance, therefore I deem it right not to omit the section. The culture of this vegetable will not be considered as affecting the *rotation;* but it may bring profit to the farmer, and must prove beneficial to the neighbouring cottars or villagers. I have long desired to see the Brassica tribes on the farm: persons forget their value.

" There are generally between 2 and 3 acres of the turnip break or field sown with cabbage-seed, the preparation for which is the same as for turnips, with the exception of an additional ploughing and harrowing." The seed is sown in August,—York and broad Battersea mixed:—both are raised always by Mr Dimmery himself. From this one sowing, from 150,000 to 200,000 plants have been sold in a season, at from 8d. to 1s. per 100; " all which remain on the ground in May, are eaten off by the sheep, and the land comes in its course for potatoes. Although the return from this crop is great, yet the expense of weeding and pulling the crop, tying them in bundles of 60 each, and carrying them to market, is great also;"—an allowance is given to the retailer, and thus the expense of attending market is saved.

Potatoes.—It will be impossible to copy the whole of this section; but there are so many points of importance in it, that, for the benefit of science, were there no other reason, I think it right to cite all the leading particulars.

"As soon as the sheep have consumed the turnips off a considerable part of the field, the land is ploughed to cover the manure left on the surface by the sheep, and to prevent it from being washed away by the rains or evaporated by drought. This is performed by the ox-teams, the horses being at this time employed in hauling the potatoes to market: the land then remains till the end of March or the beginning of April. If there has been frost to pulverize the surface, another ploughing is not necessary; and the heavy drags, loaded with blocks of timber, and worked with six oxen, go over the land twice to a place, lóosening the whole furrow-slice. The land is then rolled with a heavy roller, to bruise all the lumps brought up by the drags, after which it is again dragged in an opposite direction. If the land work well, it will do for planting after being again rolled; but if there has been no frost, or if the winter and spring have been wet, and the land has got soured by wet, or baked hard by drought, after the first ploughing, it is then rolled by the heavy roller, to crush the surface, that the drags which immediately follow may have the greater effect, and get deeper into the ground. The harrows are never used on this farm, for there are no weeds to shake out, and the object is not so much to reduce the surface, as to loosen the whole of the soil to the depth at which it was ploughed; and the greater this depth, the better it is for raising a crop of potatoes."

"*The seeds* or sets of a known true kind *are taken from the middle-sized* potatoes, not from the largest size; and they are generally cut in two, it being the principal object to obtain the greatest quantity of good edible potatoes. It has been found that the tops of large potatoes produce the greatest crops of the largest sized potatoes. Many people think it necessary to change their seed every three or four years. The seed-potato on this farm has been changed but once, about thirty years ago, when the crop was blighted from some cause, and new seed from Dumfries was then procured, and these are cultivated without any symptoms of degeneracy or deficiency."

"With regard to *planting.*—Early planting is attended with great risk, not only from frost, but because the spring rains solidify the earth round the plants, and prevent the fibres from running into the earth; or they create a much greater expense in hacking and hoeing the ground, to give a degree of looseness necessary to secure a full crop."

This light texture has always been found effectual. In my method of trench-planting, I secure it by the subsequent earthing and diggings to fill up the trenches as the stems advance;

but this applies to gardens: in the great way, Mr Dimmery's practice is very peculiar.

The operations commence about 20th April for the earlier, and 20th May for the later crop, the ground being previously pulverized in the way described. "The ridges being a perch in width, drills are formed across them, and in the following manner:—A man with a heavy triangular hoe about 4 lb. in weight, something like a trowel, but broader, with a handle about 2½ feet long, begins on one side of a ridge, by making a hollow groove or drill across the whole of its width till he comes to the other furrow; he moves backward after each stroke, drawing the hoe and the earth with him, and then lifting the hoe to make a fresh stroke and a fresh movement backward, till he reaches the opposite side of the ridge at the next furrow; he then turns about and makes a fresh drill at the distance of 22 inches from the former, till he comes to the side of the ridge where he first began; and he thus proceeds until the ridge is formed into drills 22 inches asunder, and about 6 inches deep from the edge of the earth raised up by the hoe, not, however, more than 3 inches into the ground,—about 6 inches wide at the top, and 2 inches at the bottom. No line is used, the workman, from long practice, succeeds in making them not only straight, but at equal distances. As one man proceeds thus with one ridge, others form similar drills on adjoining ridges, but, instead of making the drills in straight lines, to meet the ends of those of the first-described ridge, each of them is designedly made to begin and terminate in the middle of the space between the drills, and thus throughout the entire field. This might be thought a slovenly and irregular mode of proceeding, but Mr Dimmery has adopted this plan from the conviction that potatoes or any other plants produce a greater crop when remote from each other, and" (as Knight always observed) "that *the outside plants* of a row *are more productive* than any other plant in the row, every other circumstance being the same, and he obtains an increase of more than 5 per cent. than if the rows were in a continued straight line across the field. The drills being formed, *a man follows with a basket of soot,* and sows it in the bottom and sides of the drills by hand, walking up the middle space, and throwing a handful of soot right and left, at the rate of 25 bushels to the acre. The *sets* are then planted by women and boys, 10 inches apart, and, as the seed is thus deposited, a man follows with a hoe about 8 inches broad, and covers it by drawing the earth from the space between the drills, raising it *higher over the potatoes* than it is on each side of them. By this mode of covering, the whole of the soot does not come into contact with the seed, but is so placed as to give nourishment to the roots.

"All the operations of drilling, sowing soot, planting, and covering, go on at the same time; thus 32 people and 4 horses are in full employment till the whole crop is put into the ground; 16 men making the drills and covering the seed, and 8 women planting, can finish 5 acres a-day, with 45 sacks of seed."

The application of the soot is a circumstance to be noted,—it is a powerful manure, and tends to develope ammonia, invariably when it meets with any lime. I suspect that *nitrate of soda* will, ere long, be called in aid, for in its decomposition, which cannot but be suspected, *nitrogen*, one of the constituents of its acid, will meet with *hydrogen*, at the moment of extrication, and form *ammonia*, while the base *(soda)* will unite with a portion of the substance now termed *humus*. Be it remembered, however prejudice or ignorance may oppose the fact, that electricity is the immediate agent of these decompositions: it is the right hand of nature, and is never absent where chemical phenomena are present.

The seed being deposited and growing,—"as soon as the plants begin to shew themselves, *hoeing* or *hacking* is performed by the same peaked hoe, by repeated strokes with it into the ground, thereby moving and loosening the soil between the rows, and also between the plants in the rows, taking care not to disturb or injure the plants. Earthing-up, when the plants attain four or five inches in height, is performed with a hoe eight inches wide, to an extent nearly to cover them, for it is found that the higher the earth is drawn, the greater is the produce, and much therefore depends on its being properly done, yet none of the plants should be quite covered, as it checks their growth and gives their neighbours the start; the earth also is drawn around the ends of each row which projects between two rows of the adjoining ridge, and no loose earth is left either in the furrows between the ridges or between the drills."

"*Taking up the crop.* This is begun at the end of October, and the bulk is on an average estimated at 60 sacks each of 280 lb. per acre of one sort, 70 sacks of another, and of a third, called '*white flats*', 80 sacks, besides the broken and small tubers, and those kept for seed."

Mr F. Burke in a note estimates the average, including chats and seed, at 90 sacks, equal to 11¼ tons per acre, and this he deems "a large produce," though Mr Knight's letters to me give testimony of 20 or more tons—that is, a produce of 600 or 700 imperial bushels per acre!! The mechanical operations of harvesting and storing do not apply to our subject of rotation, therefore I extract nothing further concerning the potato excepting the annexed theoretic observation.

"The common mode of raising potatoes is to apply a large quantity of dung in contact with the seed. This has been suspected to produce a disagreeable flavour in the potato. It being Mr Dimmery's object to produce the greatest quantity of good-flavoured edible potatoes, he applies all the dung to the turnip crop, and as this is consumed by the sheep, their dung is dropped regularly over the whole surface, and is intimately mixed with it by the succeeding preparation. The whole of the staple to the depth of the furrow slice is thus enriched, not only with all the dung applied to the turnips, but also with the produce of the whole turnip crop consumed by the sheep, without any portion of the manure coming in contact with the plant."

Wheat.—"As soon as the potatoes are taken up, the field is dragged over once in the direction of the ridges; the edges of the drills, which may have been neglected by the spade in taking up the potatoes, are thus levelled, and any potato-haulm that remains is gathered up and carried off the ground; the wheat is then sown on the surface after the drags, and ploughed in; this is preferred to the common way of ploughing the land first and harrowing in the seed after, because the land, after the potato-crop, is left so loose that it is necessary to get a good clod on the surface if possible. By this plan the firm earth at the side of the drills is lifted up by the plough, and left on the surface. A team easily ploughs in an acre a day, and a man and a boy follow with spades to clean out the furrows, and level any of the ground that may be left uneven. The quantity of seed is from 3½ to 4 bushels per acre, according to the time of sowing; the later it is sown the more seed is required. Mr Dimmery thinks that farmers lose much by not putting seed enough into the ground.

"About March the wheat receives a dressing of soot, at the rate of from 25 to 30 bushels per acre. The crop is reaped and stored in the usual way in the rick yard; the average crop is from 28 to 32 bushels per acre, but he has often had 40 bushels per acre, it is always clean and of good quality; *there never was smut* seen on this farm, the reason Mr Dimmery assigns is, that he always sows *newly threshed seed, the produce of the previous year*. The crop of potatoes being his principal object, the land, by the plan adopted, is left in the best state that such land can be left in for receiving the seed."

The quality or variety of the wheat is not alluded to, but observing the allusion to the "modification of the four-course system," by Mr Millburn (p. 390), and the remarks on *red wheats* of the *Quarterly Report*, (p. 435–6), I may observe that, in Berkshire, and elsewhere, doubtless, the variety called *red-chaffed Danzig* wheat has been highly lauded of late. I know the farmer who was primarily instrumental in giving it local notoriety, a man of close observation, and of corresponding zeal. Its appearance in the field last summer was beautiful, and the flour it yields is very fine. In the north, this variety might occasionally be sown in alternation with white wheat, just as Swedes are made to alternate with common turnips. I merely suggest; but *whatever varies* (safely) *the rotation*, must tend to meliorate, or at least sustain the staple.

'*Manure* was formerly purchased, but for nearly thirty years *soot* has seen found a most valuable substitute, the carriage of which is not one-twentieth part of the expense in hauling. The general price is 6d. per bushel in Gloucester, less at Bristol and Cheltenham; and the quantity used on the farm is upwards of 3000 bushels a-year, one-half of which is applied to the potato crop, the other to the wheat." Mr Morton, who wrote the article in question, observes that he "has not obtained any idea from Mr Dimmery how the soot acts in producing such effects as it evidently does, both on the potato and wheat crop, upon the latter particularly, for, however sickly it looks in the spring, its colour and vigour of growth is changed in a few days after it has been applied."

I lay no stress on the solubility of this manure; we gain no fact by this old theory: but I see every reason to believe that a new arrangement of its constituents is produced, which induces a change in the verdure of the plant. Now, this specific action of soot very much resembles that of nitrate of soda, a salt wherein no carbon exists; therefore, we are the more inclined to refer the action of both to the development or formation of ammonia.

Mr Morton's remarks are pertinent and sensible, but they must not now be cited at length. "I have," he says, "been in the habit of riding over the farm ten or twelve times a-year, for the last twenty-five years, and can safely say, that, instead of a diminution in the crops, there has been increase, not only in the yearly return of each of the three crops, but also on the quality and fertility of the soil." Again, "It is very evident that this course of cropping must keep the land perfectly clean and free from weeds, both annual and perennial: the perfect fallow given to the turnips, followed by the preparation for the potatoes, with the complete culture given to this crop, must eradicate every weed from the soil. All the energy of the soil, all the enriching and vivifying quality of the dung, the fold, and the soot, which are yearly applied, has its full effects on the crops which are cultivated, instead of being dissipated," (or rather *consumed*) "by the production of weeds." "Indeed, from our own observation, we are convinced that the system adopted is one that ought to be well considered by every farmer in the kingdom, because that, by it, the land not only increases yearly in its productiveness, but that it also produces more vegetable and animal food for man, and at less *expense, too, than is raised by any other system.*" As to *produce,* 800 sheep are supported, 60 to 80 sacks of potatoes, each of 280 lb., equal to 16,800 lb. of good wholesome food, are grown, besides 10 sacks of offal for pigs; and the yield of the wheat crop "will be equal to 1890 lb. of bread per acre."

I regret that I have not space to enter further into particulars; much is omitted, many passages are abbreviated, though the sense of every line is preserved pure and intact. When I peruse the remarks of Mr Walker at the Aberdeen meeting, quoted at p. 413 of the last Journal, and compare them with those of Mr Milburn, I feel more than justified in thus extracting the substance of a valuable article, sanctioned by the authority of the Royal Agricultural Society. Every fact shews that no one ought to conceal or withhold knowledge of facts; and if this communication yield any local improvement, my object is gained. In the mean time, I second now (what I have been most forward for years to advocate) the appeal of Mr Boswell (p. 416), and say, "Let the Highland Society" (and the Royal Society also) "lend all its influence and countenance to the establishing of an Agricultural College and Experimental Farm." This is the "consummation devoutly to be wished," without which knowledge and science will never advance. But more of this at a fitting opportunity.*

---

* This is called a "three-field course," and contrasted with the "four-field course of Norfolk," by Mr Morton: according to our notion this course cannot be called a *rotation* of cropping. It may not be easy to give a correct definition of a rotation of cropping; since such differences of opinion exist on what it should necessarily consist. Our notion of it is, that it necessarily implies the exercise of such a course of cropping as will annually supply the food of every creature—whether human beings or animals—domiciled on the farm. Let us see whether this idea is entertained in this "three-field course." The human beings might subsist on the potatoes and wheat raised in the course. But there being neither oats nor grass in it, it is obvious, that neither horse, ox, nor sheep, could subsist by it in summer. If the whole country followed this "course," there could be no food to maintain the live-stock in summer. This system is therefore impracticable, as a general one; and if our notion of a "rotation" be correct, it does not possess *all* the properties of a *rotation*, and cannot therefore be called one. But the grass for the live-stock is grown on another farm. True. But see the consequences that such a state of things involves. In the first place, the *grass* is *excluded* from the *rotation* of cropping; it has no connection with it; the farm which grows it may be 10 miles distant from that which is pursuing the "three-field course." In the second place, though the grass-farm were adjoining the other, the proprietors of both may be different persons, and the owner of the grass-farm may object to the stock, and hay, and eat-

On the Scots Fir, Pinus Sylvestris, L. By Mr Edward Sang, of the Nurseries, Kirkcaldy.—It might have been expected that some Scots arboriculturist would, before this time, have taken notice of what was said about the Scots fir in the Quarterly Review for October 1827. Perhaps the celebrity of its reputed author* may have led to the general reception of his statements, and prevented any one from looking farther into the subject; but however that may be, I now intend to investigate shortly the history given of the Scots fir in that paper.

It says, page 580, " We may remind the young planter that the species of fir which, in an evil hour, was called *Scotch*, as now generally found in nurseries, is very inferior, in every respect, to the real Highland fir, which may be found in the north of Scotland in immense natural forests, equally distinguished for their romantic beauty and national importance. The last is a noble tree, growing with huge contorted arms, not altogether unlike the oak, and forming therein a strong contrast to the formality of the common fir. The wood, which is of a red colour, is equal to that brought from Norway; and when a plant it may be known from the spurious or common fir by the tufts of the leaves being shorter and thicker, and by the colour being considerably darker. The ordinary fir is an inferior variety brought from Canada, not more than half a century ago. Being very prolific, the nursery gardeners found it easy to raise it in immense quantities; and though a mean-looking tree and producing wood of little comparative value, it has

---

age of the grass being transferred to the other farm; because the interests of both proprietors, under such different circumstances, cannot be identical. In the third place, the grass-farm must be kept in permanent pasture, and that again implies land of good quality, for no inferior land will grow grass fit for pasture, permantly, at least not in Scotland; very little of the land of that country, and that only in the choicest spots of local districts, being capable of growing permanent pasture fit for the *fattening* of stock. No doubt there are thousands of acres of natural grass on our mountains, but not one of them can *fatten* stock—that must be accomplished in the low country—and will only keep them alive. However applicable, therefore, the plan of cropping by Mr Dimmery may be to local circumstances, it is no instance or illustration of a *rotation* of crops, and it would be inapplicable where those very peculiar local circumstances do not exist.—EDITOR.

* The late Sir Walter Scott, Bart.

superseded the natural plant of the country, and is called, *par excellence*, the Scotch fir."

What I gather from this quotation is, that, about sixty or seventy years ago, the white-wooded, or what the critic calls the "*spurious fir*," was unknown in this country, and that at that time it was introduced from Canada; and that the red-wooded variety may be found in "*immense forests*" in the north of Scotland. These are the points I call in question.

To disprove that the white-wooded variety was unknown in the Highlands of Scotland till lately, I may quote Evelyn, who, previous to the year 1669, knew it, and describes it in his Sylva as "the female, much softer and whiter" in its wood than "the male," which he says "is red."

It is fortunate that this very important point does not rest alone on the authority of one of our early writers. The Earl of Haddington, who wrote shortly after the year 1700, was well acquainted with the fact, for he says: "Though I have heard it asserted that there is but one kind of Scotch fir, and that what difference is seen in the wood when wrought is only owing to the age of the tree, and the soil where it grew, yet I am convinced it is otherwise, for this reason: when I cut down the firs that were too near the house, there were people alive here who remembered when my father bought the seeds. It was all sown together in the seed-bed, removed to a nursery, and afterwards planted out the same day. These trees I cut down, and saw some of them white and spongy, others of them red and hard, though standing within a few yards of one another." I need not point out how strongly this account corroborates that of Evelyn, that there was more than one kind, nor how completely they go to establish that the white-wooded variety is a native plant of Scotland; nor need I say one word more to shew how entirely wrong the writer in the Quarterly Review is in affirming that it was brought from Canada at the time he states, which indeed is impossible, as neither it nor the red-wooded variety of *Pinus sylvestris* is a native of Canada.

Another remarkable point established by the Earl of Haddington's Treatise, is the part of country whence the fir-seeds were got in his time. He says, "For some time I bought it of the Highlanders, who bring it from the fir-woods and sell it in the low country." But he gave over buying it, after being satisfied that the Highland seeds gave him the two sorts, and thenceforward he had them gathered from the reddest firs of his own, which, he says, were easily known by the marks made in their pruning.

That the red-wooded Scots fir is to be found in the forests of the north of Scotland, I readily admit, but that it exists by *itself* in "immense forests," I deny. I have examined much fir timber brought to the low country from the Spey for sale, and have satisfied myself of the difference in the wood. I have at intervals of years inspected on the spot the wood brought from parts in Inverness and Ross shires to be shipped at Loch Beauly, and have in every examination noticed the presence both of the red and white wooded trees; and I do not think that any of those who have been in the habit of working up the Highland timber will give a different account of its quality. Indeed I have seen Highland fir of as poor quality as any of the low country, and very far inferior to some that I have seen cut down in it; so that I cannot conclude otherwise than that varieties are to be found in every wood in the country, whether native or planted.

The late Mr Don, in a paper in the Caledonian Horticultural Society's Memoirs, vol. i., mentions that he found four sorts in some fir plantations which he examined near Forfar. The best variety he distinguished by the horizontal position of its branches, and by the "much lighter and beautiful glaucous colour" of its leaves. The common variety, he says, has its branches forming a pyramidal head, and its leaves are "of a dark or full green colour." He mentions another sort, which also has a pyramidal head, but with good timber. Mr Don states the proportion of the best sort to the whole, but does not notice what proportion there was of the next best, nor does he tell us from whence the seeds were procured; his observations, however, shew us that, in our day, there is little if any change from the state of the fir-woods in bygone times, in respect to the sorts of wood.

There is a paper by Mr Grigor in Loudon's Magazine for April 1832, which seems to aver the existence of the red-wooded variety, unmixed with the white, in *immense forests* in the north country; and the same notion is also entertained in the prize paper on Forest Plantations in the Highland Society's Transactions, as well as in an article in a late Inverness newspaper. The evidence of the fact adduced by Mr Grigor appears to me to be very slender,—being the accidental picking up of a seedling fir in a Highland wood, which proved to have been superior wood to the surrounding trees in the low-country plantation. A red-wooded plant might also have been accidentally taken from the Forfar fir wood described by Mr Don.

The author of the paper in the Quarterly Review and Mr Don give very opposite descriptions of the appearance of the red-wooded sort of fir. The former says: " It may be known from the spurious or common fir by the tufts of the leaves being thicker, and by the colour being considerably darker." The latter: " It is distinguishable at a distance by the much lighter and beautiful glaucous colour of the leaves." And what is still more perplexing is, that Mr Don says that the common sort has its leaves of a full dark green, which is the distinguishing colour of the leaves of the best sort according to the Quarterly Review.

But though it were possible to distinguish the red-wooded sort by any of these conflicting means, and so to gather seeds from it, I am not satisfied that they could be entirely depended on as purely red-wooded. Every one knows that the pollen of the fir is thrown off from the male catkins in great abundance, and completely pervades the air around, so that the seedling sorts have every chance of being mixed. The Earl of Haddington, as I have already stated, took great pains to select seeds from red-wooded trees, which he distinguished by cuts on the boles, and he succeeded wonderfully. That part of Binning Wood which was planted with firs by his Lordship, as I have on inquiry ascertained, produced timber of very superior quality.

The only perfectly secure method of procuring seeds of the red-wooded pine, would be to select, in some district of the Highlands known to produce the finest timber, a piece of ground, of some one or two hundred acres, completely isolated from other woods,—to collect seeds from red-wooded trees selected by Lord Haddington's method,—to sow these in pits about four feet apart, three or four seeds in each pit. The seedlings so obtained should be thinned out in the usual method, and the single trees afterwards (tested by cutting on their boles), until not a white-wooded tree, or one of doubtful character, is left in the ground. This is a work of too much labour and expense to be executed but by some such powerful body as the Highland and Agricultural Society. Were it put in execution, there can be little doubt that it would be of vast advantage to the country.

I hope that these remarks, which have been written with the purpose of assisting in improving our fir woods, will be read with like feeling, and that they will not subject me to the reproof administered by Lord Haddington to some writers. " Here I cannot but say something of the authors who have writ about firs. They not only shew their want of skill, but of something else, since they pretend to instruct the world in things they know not the least of, and are so far from correcting the errors of old authors, that they who have writ the last have writ the worst."

Working of the English New Poor-Law —The Poor-Law Commissioners, in their sixth annual report, printed by the House of Commons, at page 5, says, that " the expenditure for the parochial year, which terminated on the 30th of March 1840, is *greater* than that of the preceding year, which *exceeded* that of the year ending March 1837." The Commissioners add, " they are aware of the *evil* of not giving the comparative amount of poor-rates for the year ending March 1840," but promise it in a supplement, which is not yet printed by the beginning of 1841. If satisfactory, why should it be withheld? Is it less than in 1834, when, according to the Parliamentary return called *local taxation*, the rates were L.8,338,079; but suppose them, as in 1839, L.5,866,000, we are worse off even under the new than under the old poor-law, because the L.8,000,000 were only nominally given, as great part of it was really in *lieu of wages from the renting farmers to their own workmen*, or to their children, or those relatives who, if on full wages, the workmen would have supported; and however unjust the paying of *wages* out of a fund raised for the helpless, still *the land had these men's work*, and the public enjoyed the *food* they raised; but now (*the strength of the state*) the able-bodied labourers have been driven to emigrate, or are locked up useless in the English union houses. The produce of the land is so diminished, that in only seven months, from the beginning of June to the end of December 1839, the wheat (foreign colonial) imported, taken for consumption, according to the return printed by the House of Commons, amounted to 1,440,755 quarters, whilst the average gazette price was 68s. 5d. per quarter, and as foreign wheat sells usually for 10s. more, the cost was L.5,648,960 Sterling, sent to encourage foreign industry; and to this should be added increased military and constabulary force for keeping starving men from *stealing*, and the loss of every one paying an unreasonable high price for bread. Can it be denied that we are worse than under the old poor-law? But either the old or new would work well if the rates, necessarily levied on the land, were openly deducted from rent, and were the owners of the land to appoint the agents to relieve the poor, with power to dismiss them if they were not faithful to their trust. Landlords would then know the amount they pay.

I believe I pay L.1000 in rates; and if I had the control of this money, I could drain, or do other useful works on my land, or at least save this sum by letting land as I have done to J. Dumbrell, on which he maintains himself, as may be seen by this plain statement from the September Magazine of the Labourers' Friend Society:—

"According to the 27th page of the Appendix to the Poor-Law Commissioners' Fifth Annual Report, the amount of poor-rates raised in England and Wales, for the year ending the 25th March 1839, amounted to L.5,889,078; and their Sixth Report states the rates *are increased:* but as the total is not yet printed, whether more or less than under the old poor-law, can only be surmised from the amount of rates in each individual parish.

"The poor-rates in the parish of Eastbourn for the year ending the 25th of March 1839, amounted to L.1704, and in 1840 to L.1951, an increase of L.246, or nearly 9 per cent. in one year. And the increase of paupers in the Eastbourn Union-house is still greater; for, on July 9th

1839, they amounted to 144, and on the corresponding day 1840 to 219, an increase of 75 persons, or more than half of 144 in only twelve months, notwithstanding great emigration, at parochial expense, to New Zealand.

"The high price of corn was expected to occasion more hands to be employed in agriculture; but, on the contrary, fewer hands have been employed by the great agricultural tenants, who, finding fewer quarters of wheat pay their rent at 68s. than at 40s., will not take the requisite pains to raise more; and the many able-bodied men soliciting work in vain in the parishes to which they belong, is piteous to behold for their own sakes, and not less lamentable for their country's prosperity and safety: as their labour would first enrich tenants, then landlords, and through them circulate amongst all trades and professions, who cannot partake of what is not first raised from the soil. Whilst the 1,440,755 quarters of wheat imported in only seven months, from June to December 1839, at the average price of 68s. 5d., according to the return printed by Parliament, *sent out of the country about five millions sterling to reward foreign labourers, whilst our own were kept useless against their wills at home;* amongst whom, to prevent tumult, Government has thought it requisite to incur the cost of an increase of military and constabulary force. All which, can it be denied, is the consequence of *parochial guardians acting with closed doors!* Why, then, not unclose these doors, *as publicity is the safeguard of justice in all other British courts?* If the parochial guardians have acted well, they would wish to remove the suspicion which ever has attached to secret tribunals; and why departed from in the present instance can only be attributed to the supposed difficulty of their task, and the probability that those who pay the largest share of the rates would not misapply them. On this principle the Scotch poor-laws are founded, and have successfully repressed a worse state of things in the 17th century in Scotland than existed in England in the 19th.—*(See pages* 1 *and* 23 *of Dunlop on the Poor-Law of Scotland, printed in* 1828 *by Cadell.)*

"In the 16th century, as Fletcher of Saltoun stated, 'Beside a great number of families very meanly provided for in Scotland (who by living on bad food fall into various diseases), there are 200,000 people begging from door to door, a very grievous burden on so poor a country, living without submission to the laws of the land, or even to those of God and nature, and robbing many in lone houses.'—To amend which state of things various proclamations were made, the last of which was in 1698, giving the power of levying assessments, and granting relief in the first instance to those *chiefly liable to the support of the poor.* And after a trial of upwards of 140 years, Mr Dunlop, advocate at the Scotch bar, states, these laws are found in practice as nearly perfect as any system of legal provision can be; as they do not tend to encourage idleness, interfere with the profits of industrious labourers, or loosen the bonds of natural affection; and a constant intercourse is produced between the poor and those of a rank superior to themselves, which alone would render any system a blessing to the society in which it existed.'

"Is it not then desirable to examine in what the difference of the Scotch and English poor-law consists? And it will probably be found in the words—*rate-payers, and persons liable to the support of the poor*;—who, in country parishes where the land is, are two distinct classes. Those who occupy their own land, furnish all the rates they pay; but renting farmers say, as we can *give as rent* only what *remains* of the produce, after all out-goings levied on the land we use have been paid, it is our landlords and not we who support the poor. And poor-rates at Cholesbury increased till no one could be found to use the land, subject to the poor-rates, without any rent at all. And if this wanted confirmation it would be found in no one having claimed the L.50, offered in the Mark Lane Express of 7th Jan. 1839, for the first proof that any agricultural tenant ever contributed to the poor-rates levied on the land he uses, unless rates rose under lease. Many gentlemen's stewards pay away larger sums than their employers; but who considers the act of paying a proof they contribute towards the amount which passes through their hands? On the contrary, where stewards (as in London commonly) receive back a per-centage, or equivalent present, on the payment of their employer's bills, they have a direct interest in *increasing* the sums expended: and if stewards were formed by law into boards, to meet with closed doors, and were there empowered to levy as much money as they pleased, what would be the probable consequences?

"The Poor-Law Commissioners' Report in 1838, at p. 17, gives a list of able-bodied men who received, chiefly in lieu of wages, L.1906, whilst the widows, infirm, and sick, had only L.271. But in Scotland, the sums necessarily levied on produce are *openly deducted from rent*, like the land-tax, and tenants have by law no vote in the disposal of the relief for the destitute, unless they are chosen elders by the heritors* (or landed proprietors), who appoint whom they please under the name of elders, to dispose of the rates for the poor; and these elders *being answerable to their employers*, their conduct is *generally so praiseworthy*, that the heritors have rarely cause to interfere; and the resident clergy being privileged to *preside* at the meetings of the elders, called kirk-session. And have not the clergy of England reason to claim the same privilege? As at this time, in Sussex, often a sixth, and sometimes a quarter part of their tithes is deducted for rates (as 4s. 6d. in the pound at Eastbourn), not to benefit the labouring class, but to withhold labour from them. For if farmers *could not have workmen at seed time* and harvest, without keeping their men like their horses all the year round, these poor fellows would have regular employment, and thereby give their employers such an *increase of produce* as would prevent paying a double set of workmen—our own for standing still and foreigners for feeding us; and tenants might thrive as much in England as in Scotland, and pay as high rents too, if they had no more to do with the management of the rates in South than in North Britain. Whereas in *ten* out of the fourteen parishes of the Eastbourn Union, in 1834, none but renting farmers occupied to the amount *of* L.25 *a-year, they and they only could be elected guardians;* and as any guardian who would not acquiesce in the plans of the majority would be disliked, men of *respectability and adequate capitals* are so unwilling to hire land, that there is not competition enough in South Britain for landlords to obtain the fair value for their land. But confine the appointment of guardians to the owners of *real property*, as houses, lands, and tithes, and allow them to choose as guardians the persons they deem most competent for the office under the Poor-Law Commissioners, with privilege to the officiating clergyman to preside if he think fit, the English poor-law would be based on the same footing as the Scotch, and peace and prosperity be the result.

---

* Elders, being lay officers of the church, are not elected by the heritors but by the church, and they, with the minister, constitute the kirk-session of every parish. The heritors co-operate with the kirk-session in raising funds to support the poor, whenever the collections at the church doors are found insufficient for the purpose. —EDITOR.

"It is said a book has been lately published stating great distress in some of the principal towns of Scotland; and that, eighteen months since, 4000 persons died of contagious fevers in Glasgow from insufficient food, owing to the stagnation of manufactures. Was this not the natural result of the number of paupers kept *unemployed in England, which so diminished produce as to have raised the price of food*, and driven British manufacturers to transfer their capital, skill, and machinery to the continent; where, food being plenty, less wages maintains their workmen than in England. For the truth of this an appeal is made to English travellers, who see the manufactories in France, Belgium, and Germany; also to returns to Parliament of the amount of machinery exported from England.

"And to the fact of the run on the Bank of England a year ago having caused it to borrow two millions of gold from France to pay for foreign grain, as continental countries would not take English goods in exchange, now that they manufacture cheaper for themselves. And as cheap food abroad also tempts great numbers of landlords, with reduced incomes, to live there, why not induce them to return by removing the impediment to cheap food at home; which cheap produce would give increased rent; as two loads of wheat sold at ten pounds a load would pay better than one load at fifteen pounds; but as the production of two loads of wheat instead of one, would require increased diligence on the part of the tenants, experience has proved that, whilst they have their land *under its value* they will not exert themselves to make the most of it. But relieve them from the *temptation to fraud* in the office of guardian, and the respectability of the profession of farming will so increase, that respectable men with *ample capital* will as readily embark it in England as in Australia, and rents rise in England as they have in Scotland. And some of the principal renting farmers in Sussex, though they say we must, as the law is, do as others do, yet feel so strongly the inexpediency of having the management of the rates, that, in April 1834, they joined in a petition to Parliament, 'That *owners* of property may be rated to the maintenance of the poor, instead of the occupiers, and that owners be empowered to appoint agents, as in Scotland, for the disposal of funds for the relief of the poor.'

"Members of both houses of Parliament often unconsciously have hundreds, and even thousands, a-year forestalled from their incomes by poor-rates being allowed for in letting their land: but were the poor rates openly deducted, like the land-tax, when the rent was paid, is it not likely landlords would cause inquiry to be made, if there was no work as draining needed on their land, which would save keeping the able-bodied uselessly; and whether the cattle was stall-fed, which, by providing manure, would so increase produce as to save the importation of more foreign grain; and if still there appeared surplus hands, would it not be well to let each labourer a few acres for the support of his family at spade husbandry?

"The Labourer's Friend Society has proved the rents of such allotments are well paid, and that even felons having *employment*, and growing crops to lose, have been reclaimed; and how few acres will support a family, Mr Blacker, of Armagh, lately witnessed at Javington, near Beechy-head, in Sussex. After seeing many flourishing allotments in the neighbouring parishes, he asked J. Dumbrell, an infirm shoemaker, How much land have you? The reply was, Half an acre of pasture, and two acres and a half of arable land:—

On which inspection shewed, that on 88 rods there were growing 19 bushels of wheat, worth, at 8s. a bushel, ...	L.7 12 0	Sold
And on a quarter of an acre, 14 bushels of oats, at 4s.	2 16 0	
The remaining 2 acres and 32 rods fed two cows, which had yielded from the 16th Jan. to 27th July, 278 lb. of butter, at 1s. a pound, ...	13 18 0	L.19 16 0
Two calves, sold for . . .	5 18 0	
Skim-milk, sold and given to the pigs, estimated at	10 0 0	
	L.40 4 0	
In less than 7 months; and if in the remaining 5 months the butter comes only to	7 4 0	7 4 0
The total sent to market for the year will be		L.27 0 0
Or L9. per acre.*		
Carry forward, .	L.47 8 0	

---

* Do great tenants sell as much, and is it not small farmers who supply us with Irish butter, bacon, &c.?

Brought forward, .		L.47 8 0
The out-goings on which were,—		
Rent, tithe, and tax of 1 acre, near a mile from his house, ...	L.1 7 0	
Half acre of pasture, . . .	4 5 6	
Rent, tithe, and tax of the home 1½ acre of arable, ...	7 0 0	
Hired labour, L.2, and seed, L.2, .	4 0 0	
		16 12 6
Leaving, . . .		L.31 15 6

"Now had J. Dumbrell not been able to hire these three acres, he would probably have been obliged to go into the Eastbourn Union house, where it is admitted the inmates now cost about 3s. a-head; consequently five persons would have been a charge of 15s. a-week, or L.39 a-year; whereas Dumbrell has paid a high rent for the land, and shewn that only 3 acres of down land will maintain a family."

M. G.

Onion Fly (Anthomyia Ceparum). By Mr Colin Munro, Dingwall.—In the last number of this Journal is an account, given by Mr Duncan, of the ravages of a fly on the onion-crops of the south. On one of my farms on the western shores of this county (Ross-shire), I sublet the garden on it to an industrious man. Until within the last six years, he could never raise a crop of onions: they were uniformly destroyed by the fly. About six years ago, immediately after sowing his onions, he applied a thin coating of fresh sea-ware over the beds; and when the onions had grown to the height of about two inches above the ground, he removed the sea-weed in wet or dewy weather. The crop proved abundant, and ever since then he has followed the same plan, and has never failed to raise first-rate crops.*

---

* For the information of those who are not within the reach of sea-ware we may state, that a correspondent in a late number of the *Gardener's Gazette* mentions, that for several years his crops of onions were destroyed by a grub and by mouldiness coming on about their roots; sometimes when they were about the size of scallions, at other times when they were beginning to form bulbs, and even after the bulbs had been formed. The ground of his garden is a very wet stiff soil upon a strong clay, and without declivity. His preventive cure is the use of charcoal dust, which is the refuse that is left at the bottom of a charcoal pit after the charcoal for use is taken out. It is spread on the top of the ground intended for onions, about half an inch thick, before the seed is sown (the ground being previously well dug and manured), and merely scuffled over with the spade to mix the top soil and charcoal dust together. For the last six years he has had most excellent crops of onions, without the least appearance of any infection.—EDITOR.

TENTH ANNUAL REPORT OF THE PROCEEDINGS OF THE GLENKENS SOCIETY FOR IMPROVING THE CONDITION OF THE WORKING CLASSES.

By William Grierson, Secretary of the Society.

Although the operations of our Society have been confined within a narrow compass, we have always entertained the idea, that the principles which it is our object to test admit of very extensive application, and that the issue of the experiment is therefore a matter of some general importance. The experience of nine years having so far confirmed our original expectations, we submitted our last Report to the public through the medium of this Journal, and also in a separate form.* The reception with which it was honoured induces us to think that some may wish to know how the experiment proceeds; and we shall accordingly now detail the occurrences since the date of that report, with such observations as have suggested themselves on a farther consideration of the subject.

Having already explained the grounds on which our hopes are founded, it is unnecessary for us again to enter upon them at much length. So far as we are able to judge, the comforts enjoyed by any community depend much more upon the use which it makes of its opportunities—upon the degree in which each individual contributes to the common stock, and the purposes to which the portion of the joint produce falling to his share is applied, than on the advantages or disadvantages of situation. In savage life, every man must do every thing for himself; and, as he does nothing well, works only by starts, and dissipates what he produces, he is in all respects very badly accommodated. In civilized society again, each gives himself to some particular occupation, and exchanges his surplus produce for the produce of the labour of his neighbours. Being always occupied in the same way, he acquires a degree of dexterity which a person distracted among a variety of employments can never attain. By the produce of his labour, and what it enables him to purchase, he is put in possession of comforts which the solitary labours of a savage could never have procured, and, looking forward to the future, he is prepared for its demands when they arrive. This, at least, is the character of a large portion of a civilized population, and such are the benefits which have been realized by them even under circumstances the most adverse.

---

* Blackwood, Edinburgh; Cadell, London.

Yet all the members of a civilized community are by no means equally dexterous and equally provident, and their comforts are consequently very various. But there can be no doubt that if we could make the bad workman equal to the good, and convert the prodigal into an economist, we should take the most effectual means of raising their condition to an equality with that of the well conducted. No doubt it will be said that the general accomplishment of such a change as this is impracticable. We know that it is not to be effected upon a whole population; but, as it is in consequence of a larger portion of each succeeding generation becoming dexterous workmen and good managers that society has continued progressive, it is certainly not impossible still farther to increase the number of good workmen and good managers, and, consequently, to diminish in an equal degree the number of those who are altogether unproductive, and hang a mere load upon the public.

Perhaps it may be objected, that by such means the market would in the end become overstocked; and so it certainly would were the produce of one trade only to advance while every thing else remained stationary, but if the produce of the whole trades of the community shall increase in the same proportion, each individual, with his enlarged surplus produce, will be enabled to purchase a proportionally larger share of the produce of his neighbours. There would thus be no danger of the stock accumulating on the hands of the producers, but dividing among the whole community, it would afford to each a larger portion of all the comforts of life.

The circumstances of the country were never more promising than at the present moment. The great works which have been executed by individual enterprise, or the joint efforts of numbers, have paved the way for farther undertakings which are giving new employment to every branch of industry, and these, to all appearance, are only a prelude to a long train of others. While this state of things continues, the most effectual way of benefiting every member of the community is to inure him to habits of steady persevering industry, and qualify him for taking his part in the works which are going on. If we can accomplish this, good management will follow as a necessary consequence.

It has justly been said that honour is the nourishment of art; and, from the time when a boy enters school till he takes his place among the finished workmen of the district, our object is to make him feel that all eyes are upon him, and that no talent which he may exhibit can pass unnoticed. Thus trained, he enters life with a character already established, which it becomes his study to preserve, and if possible to raise. None who have gained distinction with us in their earlier stages have disappointed our expectations, and we believe there is hardly one of our tradesmen who would not rather decline a piece of work than execute it in a manner which, although it might pass with his employer, would be injurious to his character with the public.

In going over our individual competitions, we shall only mention the very slight alterations which have occurred, referring to our former report for every thing else.

Our school competitions still excite the same degree of interest, and the number of prizes given from parish subscriptions has exceeded that of former years. But the emulation produced by prizes which are confined to a single school is found to be very inferior to that which is excited by those district contests, in which the victor establishes not merely his own superiority, but (for the time at least) the superiority also of the school at which he has been taught. This has been so much felt by the masters themselves, that they have requested us to institute a farther district competition in Writing, in addition to the two which we have had from the first. One of these is confined to a class of twelve years of age, the other to a class of the age of sixteen, thus leaving four years during which the stimulus of the district competition has been altogether suspended. It is the wish of the masters that we should have a third district competition for a class not exceeding fourteen years of age. We need hardly say that the directors have very great pleasure in complying with this request, which is equally decisive of the efficiency of the system, and of the character of the teachers. Such a comparison would not be desired by masters conscious either of neglect or inability; and though it must issue in the preference of an individual, even those who may fail may be safely pronounced vastly superior to the ordinary run of teachers, whose energies have not been called into action by the same means. Neither would a comparison of this kind be wished by masters of such talent, had their experience of similar competitions not fully satisfied them of their beneficial effects. We must, then, regard this as the most conclusive proof we have yet had, that, so far as regards education, our own anticipations, sanguine as they have certainly been, have not been higher than we were warranted to entertain.

The joiners, again, came from a distance to attend their competition; and the master blacksmiths have, out of funds raised by themselves, added a competition in welding to those in horse-shoeing and flat-filing, instituted by the Society. This is another evidence of the benefits of the system which cannot be misunderstood. Although there has been as yet only one trial of this new exercise, the specimen executed by the winner is so perfect that the joining is hardly perceptible. Owing to the lateness of the season, and the unfavourable nature of the ground chosen for the ploughing-match, we had not so many competitors as in former years, but, in the opinion of good judges, the work was never so well done, and on no former occasion was so large a sum contributed for prizes,—another proof that the benefits attending the system are continuing to rise in the estimation of the district.

Nor have the effects of our efforts to improve the domestic habits of the population been less encouraging. We had little short of thirty competitors for our premiums given to promote attention to dunghills; and many who did not join in the contest, and who were not before at all remarkable for regard to this branch of economy, have kept their dunghills with as much care as those who entered their names.

Our cottage premiums also continue to be well contested, and are gradually bringing about a most favourable change on the general aspect of the country. The specimens of garden produce exhibited at the competition which was instituted in consequence of the valuable donation of books from the Messrs Chambers, far excelled those of last year.

This exhibition took place on the day of the annual cattle show of the Agricultural Association, which is a separate institution from ours, but must be regarded by us with fraternal affection, as carrying precisely the same principles into a different department. They very kindly altered the usual time of their meeting, that the members of our Society might have an opportunity of being present. The stock exhibited, in the opinion of able judges, did much credit to the district; the meeting, both in point of numbers and respectability, was beyond all precedent, and the entertainment which followed was worthy of the occasion. It indeed far surpassed what could have been expected in our retired glen, and would have done no dishonour to a place in which such assemblies are frequent. The duties of the chair were performed with much ability by one of our principal non-resident proprietors, and we believe few parties of the kind have been more animated or more harmonious. Every political difference was forgot in the all-engrossing wish to promote the general improvement of the district, and to give increased energy to that spirit of generous rivalry which pervades every branch of its industry. A wish has been expressed from all quarters that the exhibition should be repeated annually, and preparations for next year are already in progress.

We attach the highest importance to such meetings. Our very existence depends on the favour of the public. It is only by bringing into light the merits of the deserving, and securing to them the patronage which is their due, that we can have the slightest chance of prevailing on them to put forth their strength. Our clerical friends,—our resident proprietors,—our respectable tenantry,—have all done their utmost. Still, that the owners of no less than five-sixths of the land of the district have had no opportunity of shewing their approbation of our proceedings but by their annual contributions to our funds has been a serious impediment to our progress. But we have now seen that the district contains enough to render such an exhibition not merely interesting to those immediately connected with it, but attractive even to strangers, and to these exhibitions we look as the means of supplying the only want of which we have had to complain. By them not only are specimens of important branches of the produce of the district brought under the eye of the visiter of a day, but he is made acquainted with the progress of improvement in all its departments by the addresses of competent judges who have marked every step. To the proprietor whose other avocations compel him to fix his permanent residence elsewhere, they afford an opportunity of estimating the worth of his tenantry, and affording to them the encouragement which they deserve; and to the tenantry they give an opportunity of shewing their attachment and regard to such a landlord. We had a proof of this in the rapturous cheers with which the health of our chairman was received, and, if we mistake not, still more substantial proofs await him of the value which his tenants set upon his countenance. Much and deservedly as he was pleased with the stock which they exhibited on the late occasion, we feel assured that he will have still greater reason to be proud of that which will be brought forward next year, under the influence of the spirit which his presence has excited. The whole powers of the district may now be said to be in a state of complete activity, and we look forward with certainty to its steady and rapid advance in every thing that can contribute both to the moral and to the physical improvement of its inhabitants.

Our report may now be considered as closed, so far as regards our own district; but it is not as a mere local matter that we submit the subject to the consideration of the public, and we shall again, as in our last report, proceed to inquire whether the same principles, which have certainly been productive of singular benefit with us, may not prove equally beneficial in other quarters, and when applied to other objects.

We took the liberty of offering some remarks in our last report on the state of education in this country. It appeared to us then that, if the Scottish system be at all inferior to the systems of some of our Continental neighbours, it is chiefly because with us there has not been that individual responsibility in the central management which is necessary to ensure attention to the duties of the office. In every public body some one must take the lead, but here there has been no recognised leader amenable to the bar of public opinion for his neglect or maladministration. The reports which have of late been made to the Assembly we understood to be the production of the reverend father whose name they bear, and, as a labour of love, they appeared to us to be very much exempted from comment. We are happy to hear that in this we have been mistaken. The whole details of the state of education in the different presbyteries, we are now informed, are prepared by a gentleman filling the office of secretary to the committee. He is universally admitted to be eminently fitted for the office. We understand that his situation is not gratuitous, and we trust that his remuneration is sufficient. That, however, is a matter of secondary importance. The principle being once conceded, that the business of the committee is to be arranged by a paid officer, we may rest assured that the public will not allow the labours of so important a situation, if properly executed, to be long underpaid. As they will assume the privilege of criticising his proceedings, they will take care that his emoluments shall be such as to enable him to discharge his duties in an efficient manner.

It is a farther gratification to us that Government has undertaken to go hand in hand with the Church in supplying the educational wants of the country, and we saw no cause of regret in the appointment of the same gentleman to the inspectorship of the Government schools, whose qualifications had pointed him out for the important office of secretary of the Assembly's committee. This arrangement seemed likely to introduce into the management of the church, that business-like regularity which we have a right to expect in a branch of the executive. On second thoughts, however, we are not sorry that the two offices have been disjoined, as the advantages and disadvantages of each system will thus be rendered more apparent, and there will be a greater certainty of the best parts of both being ultimately adopted.

Some, we know, had fears that religious instruction had not been sufficiently provided for in the Government plan; nay, that its very object was to withdraw the public attention from this all important subject. We confess that we were ourselves among the number of doubters; and, as it appeared to us, from the discussions in Parliament, not without considerable reason. But the plan, as subsequently explained by the proceedings of the Committee of the Privy Council, seems now to be free from all such objections.

No doubt it is stated in their minutes of 1st June 1839, that they "experience so much difficulty in reconciling conflicting views respecting *the provisions which they are desirous to make* in furtherance of her Majesty's wish, that the children and teachers instructed in this (the normal) school should be duly trained in the principles of the Christian religion, while the rights of conscience should be respected, that it is not in the power of the committee to mature a plan for the accomplishment of this design without farther consideration; and they therefore postpone taking any steps for this purpose until greater concurrence of opinion is found to prevail." In accordance with this resolution, the committee have also declared, that inspectors are not to "interfere with the religious instruction, or discipline, or management of the school, it being their object to collect facts and information, and to report the result of their inspections to the committee."* But although the Committee have thus delayed instituting a plan of their own, it was expressly resolved by their minute of 3d December 1839, that "the daily reading of a portion of the Scriptures" should form a part of the instruction in all schools to which their aid should be extended; and in the rules for inspectors, their Lordships declare, that they "are strongly of opinion that no plan of education ought to be encouraged in which intellectual instruction is not *subordinate to the regulation of the thoughts and habits of the children by the doctrines and precepts of revealed religion.*" It appears farther, from the letter of Dr Kay to the secretary of the Assembly's committee, dated 4th January 1840, that Government are desirous to cooperate with the church in all matters relating to education, and that they are to consult the Assembly's committee in the appointment of all inspectors. In these provisions, it humbly appears to us that we have a perfect guarantee for a due regard to the principles of religion, in all that may be done by the committee.

---

* Reg. A.

That difficulty being overcome, no one can doubt that the aid of Government will be of the utmost importance. Embracing a range of observation far beyond what falls within the reach of the Church, they have it in their power to diffuse a knowledge of improvements throughout the country, which the other avocations of the clergy preclude them from acquiring in any other way. A great deal has been done by the committee already; much will be found in the minutes circulated by them, which appear to us to be well worthy the adoption of the Church, and which we have no doubt the secretary will introduce to their favourable consideration.

As the principal defect of the central management appears to us to have been a want of individual responsibility, or at least a want of an individual *ostensibly* responsible to the public, so this also seems to be the prevailing imperfection in the rest of the system. The reports are required not from individual clergymen, but from presbyteries, which really infers responsibility in no one. The consequence is, as we mentioned in our former report, that in many cases no reports are made at all. Sometimes the reports state that schools have not been examined "from want of time," and it may readily be conceived that, in districts where schools are numerous, or the distances great, it may be impossible to collect a committee of clergymen for the examination of each. At least it may require a greater effort than can be expected from a body among whom censure is so much divided as to be harmless. But sometimes there have been omissions, and that to the extent of many schools in a single parish, without any reason being assigned. Scarcely in any instance are the particular schools mentioned which call forth the praise of the reporters, though many are said to be "admirably conducted." Neither is there any explanation given of the particular merits of such establishments. In mentioning these omissions, we must not be understood as reflecting on the clergy of our national Church as a body. In place of being surprised that such occasional neglects should have occurred, we have much greater reason for astonishment at not finding more flagrant omissions under a system which leaves attention and inattention equally unnoticed.

It appears to be the design of Government, that every school which is to obtain their aid, shall be under the superintendence of a committee composed of the principal inhabitants of the place; and, were the kirk-session vested with a similar charge, we feel assured that the duties would be much more efficiently performed than they can be by the present machinery. The minister, as moderator, would feel himself bound to see the work properly done, and duly reported to the secretary, for which the reduced rate of postage would afford every facility; and the secretary, or whoever may be charged with the preparation of the general report, we should hope, would not feel himself at liberty to slur over any neglect. This arrangement would not prevent the aid of neighbouring clergymen from being taken when it could be obtained; but the minister, with his session always at his command, would not then have it in his power to say that he could not assemble his committee. A very frequent excuse for the omission of private schools is, that they are taught by dissenters, and we are far from wishing to see our clergy entering into unseemly altercations with these teachers; but surely no teacher is fit for his situation who will not admit the respectable inhabitants of the district, of whatever denomination, at least once a-year, to a full inspection of his system. The minister ought at all events to require admission, and if it is refused, the public ought to be made acquainted with the fact. Few parents, we believe, would be willing to intrust their children to such masters, and a general acquiescence on the part of the teachers would certainly be the consequence.

But all these defects in the details of the Scottish system of education, springing, as they plainly do, from the inefficiency of the central management, must be ultimately charged upon the framer of the general report. A bare detail of what has been done in different parts of the country, under existing regulations, is certainly not all that should be found in such documents. It is impossible for any one to go over the materials from which these reports are compiled, without seeing much to commend, and a good deal also to condemn; and it is the unquestionable duty of the individual to whom this work is committed, to bring all such matters forward in a prominent manner for the consideration of the committee. In this respect we must say that the reports which we have seen are all of them defective. Such suggestions as are made by presbyteries have no doubt found a place in the general report; but no attempt is ever made at examining whether the changes proposed are judicious or otherwise, and never does the writer seem to consider that improvement of any kind ought to originate with himself. He does not say what he thinks should be done to induce clergymen to report, who have hitherto neglected the instructions of the assembly, or how the services of the zealous may be rendered more effective,—how the merits of deserving teachers, and the benefits of approved systems, may be best brought under the notice of the public, or by what means indifferent teachers may be improved and bad systems exploded. Elementary education is beyond all comparison the most important department to the great body of the people, and it is accordingly receiving the first place in the plans of Government; but in the schedule of the Church it is still postponed to everything else, the reports of presbyteries are in conformity with the schedule, and the general reports propose no alteration.

It is plain to us that whoever has been charged with the duty of drawing up these reports, has formed much too humble an estimate of the importance of his own situation. It is beyond doubt that, as he is the only person who has the whole system under his view, and is fully cognizant of the changes which it requires, he ought to lead the whole proceedings of the committee. He has it thus in his power to do infinitely more for the cause of education than any man in Scotland. If we are rightly informed that this duty is committed to the secretary, we have no doubt, from his high character, that, when the energies of his mind shall be brought fully to bear upon the subject, he will entitle himself to the gratitude of the country.

The operation of the Government plan is to be made known by means of reports to Parliament. The reports of the Church, though circulated among the clergy, and distributed also with much liberality to those who ask for them, cannot be said to be patent to the public. We are sure they would be interesting to many who have at present hardly the means of procuring them, and we would humbly suggest, that, for the convenience of all, they ought to be offered for sale. This would lead to an annual review of the educational proceedings of both Church and State in the various periodicals of the day, and bring the merits and demerits of each system fully under the notice of the country.

We trust that these remarks will be excused. They are prompted by a sincere attachment to the Church, and a desire that she may retain her place in the affections of the nation, by correcting whatever appears to require amendment.

We have still another observation to make more immediately connected with the subject of this report. In one respect, the systems both of the Church and of the Government appear to us equally imperfect. Both are altogether dependent on the superintendence of inspectors. It is justly observed in a report from the presbytery of Dalkeith, that "it is quite possible for a teacher to neglect his duty for the greater portion of his time, and yet, by a few weeks' hard drilling before the annual examination, to cause his pupils to make a tolerable appearance for a few hours in presence of the committee." In proof of this we may mention an incident which happened at an examination of a school of very high character. As it occurred many years ago, we run no risk of being thought to reflect against any individual teacher of the present day, by making it public. A class being called up, the master offered the audience the choice of the passage on which they were to be questioned. Those present happened to be mostly females; and he requested a friend of his own to make the selection. A passage was accordingly pitched upon, and before a question had been put, the master defied all present to detect one pupil in the whole class in a single mistake. They certainly made good all that he had said; but the book which happened to be thrown to our informant opened as if by magic at the very passage chosen apparently at random to test the proficiency of the class; and, though soiled nowhere else, it there presented such marks of "drilling" as no one could mistake. To this we shall add another occurrence of old date, precisely of the same kind, which also happened in a school of very high reputation. A question was put by the master to one of his pupils, with the preface,—"Now, my boy, I will ask you something very difficult," and difficult the question certainly seemed; but it was answered at once, without a moment's pause, to the great admiration of the hearers. A few days after this a gentleman who had been present on the occasion, returned to see a little more of this wonderful seminary. There was again a large party assembled, few of whom, it may be presumed, had been in the school before. Very probably the master thought none; for he not only once more called up the same boy to exhibit, but put the same identical question to him, with the same preface, and the whole farce which had been gone through before, was word for word repeated.

Both of these were esteemed excellent masters, and we believe were, in one sense, perfectly deserving of their name; but not contented with such excellence as may be attained by men, they wished to be regarded as superhuman. What was done by them may be done by others; and, as is stated by the presbytery of Dalkeith, the neglect of a whole season may be concealed by a few weeks' hard drilling. Nor is this all: the children are made parties to the fraud; and, in place of being taught to regulate "their thoughts and habits by the doctrines and precepts of revealed religion," which is justly declared by the Committee of the Privy Council to be the grand object of education, their master actually becomes their first instructor in all the arts of deceit. Yet, in such a case, an inspector would unquestionably report that the school was admirably taught, though the most important part of education, the regulation of "the thoughts and habits," had not only been neglected but perverted.

In opposition to the system of mere inspection, may we not be allowed to place that of competition. Would it be possible for a master to gain a reputation by such means, were his merits tried by a comparison of his pupils with the pupils of other schools? He would make but a poor figure with the drilling of a few weeks when compared with masters like ours who have been drilling the whole year; and as the most assiduous preparation of a single passage, or the most intent study of a few difficult questions would not serve his purpose, he would make no attempt to deceive the public by such expedients.

We mentioned in our last report that the Highland and Agricultural Society had put their cottage premiums very much upon the system followed by our Society. It is stated in the report of their committee of this year, "that the first year of the cottage premiums being offered upon this plan, they were in operation in seven parishes, and there was competition in three. Last year was the second; they were offered in sixteen parishes, and there was competition in eight; this year they have been offered in twenty-four parishes, and there was competition in fifteen." Then follows a state of the numbers of competitors in each parish; in Culter 10, in Avondale 22, in Carrington 14, in Liberton 18, in Stow 10, &c. Extracts are given from the reports of the different parishes shewing the effects which they have produced, and the general conclusion drawn by the committee is, "that the result of the experiment under circumstances so various, leaves no room to doubt that the plan of the Society is perfectly calculated to accomplish its object."

In our last report, we entered into some inquiry regarding those districts of the Highlands which are considered to be suffering from an excess of population. It appeared to us that, if the population were instructed in the use of the spade, they would have no difficulty in obtaining profitable employment, either in cultivating the land of their own districts, or in some of the great works which are going on in other parts of the kingdom, and that the harsh expedient of a forced emigration would thus be altogether avoided. As a means of perfecting them in the use of this implement, and of overcoming the slothful habits which affect them in common with all communities in the same state of civilization, we took the liberty of suggesting that spade competitions might, with much benefit, be instituted by the Highland and Agricultural Society, on the same principles as their ploughing matches. Our proposal was received with the attention which that body never fails to bestow on every plan for the improvement of the country, from whatever quarter it may come. Premiums of this kind were offered by them under certain conditions; and at Whitsunday last, the system came into operation in five different parishes of the Western Isles. The 1st December was the time fixed for reporting these competitions; but already reports have been received from three parishes situated in the island of Islay, and they have been kindly communicated to us. Mr Campbell of Islay, the convener, was present at all of these competitions; and reports, that in the parish of Kilchoman there were seventeen competitors, in Bowmore thirty-three, and in Kildalton twenty-four. He states, that the premiums were "all very keenly contested;" and Mr Chiene, the factor on the estate, says, in a letter which accompanied the report, "no prizes were ever *more* keenly contested. At Kilchoman and Bowmore, *men were carried off the ground fainting from over-exertion.* So at Kintraw we gave them a time to do their work in, to prevent the fearful *kemping.*" "It is quite a thing to Islay men's fancy, delving being just as good a way of proving a man's superior prowess, as wrestling or *putting the stone,* &c. and much more useful. *I have no doubt that they will have as much pleasure in learning to excel in wielding the spade, as they used to have in excelling in athletic games.*" Unquestionably the efforts made at the first two competitions went far beyond what could be wished, but by the simple expedient adopted at the last, any strain which could injure the health of the competitors was effectually prevented, without at all damping the spirit of emulation. Our expectations that the indolence of the Highlanders would be banished by these means have thus been completely realized; and that point gained, there can be no doubt of their ability for work of any kind. Mr Chiene says,—“ These competitions will do good in many ways. They will promote dexterity in digging, and shew them that good wages may be made at the work; fivepence a perch is usually paid for delving moss, at which rate many declared no wages could be made. Now, the competitions have proved that an ordinary hand can make wages at a less rate.” The report states, that the lot assigned to each competitor extended to three and a half falls; that Peter Clark “ turned over his lot, at a depth of not less than eight inches, in two hours and eleven minutes. The next finished his lot in two hours and thirty-seven minutes; and the last of the competitors at Kildalton had his lot finished within four hours, the time allowed.” Mr Chiene says, “ I will back Peter Clark against the winner at any of the other competitions in Scotland.” Regarding the means of employment which Islay affords, Mr Chiene says,—“ There is no scarcity here of unreclaimed land to take lessons on, and, when the moss is turned over, there is plenty of lime to lay upon it, and shell-sand (which is better than lime for moss), and, with the addition of sea-ware, it yields excellent crops.”

These competitions, then, promise effectually to supply the wants of the population of Islay, and they would appear equally applicable to many other districts of the Highlands. There are no doubt, however, situations in which it would be impossible to find constant employment for the population in this way. But we have the authority of two extensive railway contractors for saying, that in such work a labourer may earn from 9s. to 11s. per week in winter, and from 11s. to 15s. per week in summer. They farther say, that they have had an opportunity of comparing labourers direct from the Highlands with those from other parts of the three kingdoms; that in every kind of earth-work the Highlander becomes equal to any of them in the course of a few months, and that in steadiness he is preferable to them all. Here, then, are means of employing the redundant population of these districts for purposes of the highest utility to the country, and without doing the slightest violence to their own inclinations. The journey can never occupy many days, and with the confidence in their own powers acquired in these competitions, and the certainty of such ample wages, there could be no difficulty in prevailing upon them to make the change.

But, while the views which we have endeavoured to explain appear to us to be supported by all that can be gathered from the history of our own country for the last fifty years, and by the results of such experiments as have been made for the purpose of determining their accuracy, we are aware that some, whose opinions are justly entitled to much respect, have come to a very different conclusion. At the head of these stands Dr Alison, who, after spending much of his time and money in relieving the wants of the distressed, is now endeavouring to unite the sympathies of his countrymen in the same benevolent work. He holds that with us society is in a state of continued deterioration, and that the only way of alleviating the sufferings of the poor is by drawing largely from the pockets of the rich.

It is with the utmost diffidence that we venture to express an opinion opposed to that of a man who has studied this subject so long and so zealously, not merely in theory, but in all the details of practice. Still we cannot help thinking that the facts from which Dr Alison draws this conclusion by no means make out the position; and that the opinion which he has formed on this subject may be traced to a too hasty adoption of the leading principles of Mr Malthus. As we are sensible that our own proceedings have been in direct opposition to that theory, we thought it necessary for our justification to consider it at some length in our 7th Report. We again glanced at the subject in the Report of last year, and we cannot avoid once more returning to it, finding the views of Mr Malthus not only adopted theoretically by so able a judge as Dr Alison, but held to be an infallible guide for practice in all respects, excepting only in so far as regards a provision for the poor.

The converse of the propositions maintained by Mr Malthus has again and again been demonstrated in a manner, to our minds, perfectly satisfactory, yet without at all impairing the confidence of his followers; nor can we blame their reliance upon their own argument; for, although two adverse propositions cannot both be true, the error may exist in the premises, or reasoning on the one side as well as on the other; and until it is actually pointed out, each party may be permitted to say, that the mistake lies not with them, but with their opponents.

What, then, are the grounds on which this theory rests?—In support of what has been called the principle of population,—the assumption that, according to the natural constitution of the human race, they ought to double their numbers every twenty-five years, the first authority given by Mr Malthus is that of Dr Franklin, who states the increase of our race to be so rapid that were the world "empty of other inhabitants, it might, in a few ages, be replenished from one nation only."* This opinion is given in one of those short essays which are rather intended to amuse than to instruct; it is altogether unsupported by any tangible facts, and we presume that it will not be seriously relied upon as evidence. The next authority is Dr Price, who is adduced to prove that in North America "the population has been found to double itself for above a century and a half successively in less than twenty-five years;" and that in the back settlements, "the population has been found to double itself in fifteen years."† These statements have so little connection with the subject immediately before Dr Price, that he thinks it necessary to apologise for the digression. They are taken from an American sermon upon Christian union, a subject certainly as foreign to such statistical inquiries as that which was under the consideration of Dr Price. Where the American may have got the facts does not appear. We know nothing of his character as an author. Certain it is that his work did not obtain the permanent favour of the public. It appears to have been published in 1761, and not one entire copy of it seems to have been extant when Mr Malthus wrote, for he says himself that he had only seen extracts.* But whatever may have been the value of this work, it is not a little singular that Mr Malthus, knowing where even a part of the information which it contained might be seen in the author's own words, in place of directing his readers to these extracts, only refers to the account of their import given by Dr Price. The report of another can in no circumstances give an author's meaning so correctly as the expressions used by himself; and in the present instance there could hardly have been a more objectionable reporter than Dr Price. He not only cites the facts in question in support of a particular theory, but draws a conclusion from them which is admitted upon all hands to be erroneous, viz. that a country whose population increased so rapidly must be remarkably healthy. Mr Malthus himself admits, that "such situations are not in general considered as particularly healthy."† When Dr Price was thus misled by his theory to a wrong inference from these facts, it is extremely probable that it may have distorted his view of the facts themselves. Neither, then, we presume, will this train of hearsays be deemed a firm foundation for mathematical inductions like those of Mr Malthus. The next authority quoted for the principle of population is a table calculated by Euler, from which it appears that if the deaths are to the births in the proportion of 1 to 3, a population will double in 12⅘th years.‡ We do not at all question the accuracy of this calculation, but we have seen no evidence that the deaths and births have anywhere existed in this proportion. The last authority referred to in this part of the work is Sir William Petty. "Sir William," it is said, "supposes a doubling possible in so short a time as ten years."§ And no doubt he does state this as a possibility, but the period assigned by Sir William for doubling, from actual observation, is from 1200 years to 120, and he fixes on 360 years as the probable period as a mean between these extremes. Upon these authorities, Mr Malthus holds his first proposition to be completely established. Omitting altogether the conclusions drawn by Sir William Petty from what had actually occurred, and placing implicit reliance on statements originating we know not where, but first appearing in a short-lived sermon upon a totally different subject, and afterwards again casually repeated by Dr Price when he too is treating of other matters, Mr Malthus gravely issues the following judgment: "To be perfectly sure that we are far within the truth, we will take the *slowest* of these rates of increase, *a rate in which all concurring testimonies agree*, and which has been repeatedly ascertained to be from procreation only. It may safely be pronounced, therefore, that population, when unchecked, *goes on doubling itself every twenty-five years*, or increases in a geometrical ratio."‖

---

* Malthus, 6th edition, p. 2.

† Ibid. vol. i. p. 5.

Mr Malthus then goes on to another branch of the argument, but he resumes this subject in a chapter devoted to "general deductions from the preceding view of society." He there refers to a calculation by Dr Short, that the Jews doubled every fifteen years while in the land of Egypt, but without giving the Doctor's explanation, viz. that among the Jews there was a great proportion of males, that polygamy prevailed among them, that they took their wives from other nations, and that their whole history is a miracle. He also refers to the rapid progress of population in the colonies of ancient Greece and the American colonies of Spain, but without attempting to specify the rate of increase. The only authorities bearing even the semblance of evidence are the government enumerations of the United States referred to in the article Population in the supplement to the Encyclopædia Britannica. These shew a doubling in twenty-three years, but they do not shew to what extent this increase is made up of immigrants and the descendants of immigrants, and there is no satisfactory way of supplying the desideratum.

---

* Malthus, vol. i. p. 517.
† Ibid. p. 6.
‡ Ibid. p. 6.
§ Ibid. p. 6.
‖ Ibid. p. 6.

This is the whole evidence adduced for the principle of population, and it certainly falls very far short of bringing conviction to our minds.

But granting this first position of Mr Malthus, how does he answer the other question which he undertakes to solve, viz. "What might be expected to be the ratio of increase in the productions of the earth under the most favourable circumstances of human industry?"* He admits that this is not "easy to determine;" but he says we may "be perfectly certain that the ratio of their increase in a limited territory must be of a totally different nature from the ratio of the increase of population."† We do not see how this is so clear. The principles of reproduction are confessedly the same throughout the whole animal and vegetable kingdoms, with this difference only, that whatever is necessary for the support of man increases with much greater rapidity than the human species; and by encouraging what is useful, and repressing what is hurtful, we are enabled to augment the means of our own subsistence to an extent which, if not infinite, is at least indefinite. Mr Malthus admits that there is still a great portion of uncultivated land both in England and Scotland. But he says, "if it be allowed that by the best possible policy, and great encouragement to agriculture, the average produce of the island could be doubled in the first twenty-five years, it will be allowing probably a greater increase than could with reason be expected. In the next twenty-five years it is impossible to suppose that the produce could be quadrupled. It would be contrary to all our knowledge of the properties of land. The improvement of the barren parts would be a work of time and labour; and it must be evident to those who have the slightest acquaintance with agricultural subjects, that, in proportion as cultivation extended, the additions that could yearly be made to the former average produce must be gradually and regularly diminishing. That we may be the better able to compare the increase of population and food, let us make a supposition which, without pretending to accuracy, is clearly more favourable to the power of production in the earth than any experience we have had of its qualities will warrant. Let us suppose that the yearly additions which may be made to the former average produce, instead of decreasing, which they certainly would do, were to remain the same, and that the produce of this island might be increased every twenty-five years by a quantity equal to what it at present produces." He says, "the most enthusiastic speculator cannot suppose a greater increase than this;" and extending the supposition to the whole earth, he thinks it may be fairly pronounced, that "the means of subsistence, under circumstances the most favourable to human industry, could not possibly be made to increase farther than in an arithmetical ratio."*

---

* Malthus, vol. i. p. 4.

† Ibid. p. 6.

This very decided answer to a question which Mr Malthus admits is not "easy to determine," is given not merely without authority, but without examination. He admits that something may be done by reclaiming waste land, but he seems to calculate on no possible addition to the produce of the land already under cultivation. He does not look at the effects of an improved rotation of crops; he anticipates nothing from draining, from irrigation, from manures already known, or from others which science may disclose. He makes no account of the productions, animal and vegetable, which may be introduced from other countries; nor does he consider to what extent all the productions of this island, both exotic and indigenous, may be improved by a systematic selection of the best specimens for continuing each species. He does not pretend to foresee how far animal power may be superseded by machinery, and what quantity of food now consumed by animals may by such means be saved to the human race. Neither does he think of the produce which improved means of transit may bring to the general market from tracts of fertile land hitherto cut off by impassable barriers. On not one of these questions does Mr Malthus bestow a moment's thought. But although he had not only answered them all, but comprised in his estimate the exhaustless stores of the ocean with the fruits, the flocks, the herds of other climes, much would still have remained to be unveiled. We have no reason to suppose that the kind of matter required for the support of the human body is to be found only in those articles now used by us as food. The chemist tells us that the materials of which it is composed exist everywhere; and who will say that productions of the earth, now esteemed utterly useless, or applied only to inferior purposes, may not, in a more advanced state of science, be made to yield wholesome nourishment to the human race. What short of that Wisdom which contrived the universe is capable of completely resolving it into its elements? of saying how these elements may be combined, and what may be the result of such combinations? Shall "vain man, most ignorant of what he's most assured," whose utmost efforts carry him but a few moves into the mysteries of a chess-board, presume to fathom the plans of his Creator, and fix limits to the bounty of Omnipotence? Even the short period which has elapsed since Mr Malthus uttered his prophecy has sufficed to falsify the prediction.. We have it vouched by the authority of Mr Dudgeon, an intelligent practical farmer, that, since the year 1783, the produce of land which was then under culture has not remained stationary, as anticipated by Mr Malthus, nor even advanced only at the slow rate assigned by him to the general produce of the country; but that the weight of the annual return has actually increased in the ratio of 48 to 415, nearly tenfold.* Almost the whole of this immense increase appears to have taken place since the year 1796, little or no change having occurred from 1783 to that period.† This brings the commencement of the new era almost to the date of the essay of Mr Malthus, the first edition of that work having appeared in 1798. Yet the districts in which this astonishing improvement has been accomplished are still continuing their progress. Mr Malthus not unfairly concludes, that what is practicable in Scotland may be effected in any other part of the globe. If, then, we estimate the future prospects of our race, not by the random suppositions of a mere theorist, but by what has actually been done in this country, with all its disadvantages, we shall find no room for anticipating that the means of subsistence are to be cramped in the manner Mr Malthus has supposed.

---

* Vol. i. p. 9 and 10.

But if Mr Malthus has failed to establish either of his two cardinal propositions; if the increase of the human species, or the increase of the means of subsistence, has not been proved to follow the laws which he has laid down, there is an end of the whole theory. The rest of his work consists of mere assertion.

Thus he says, among savage nations, the direct checks of vice and misery are necessary to keep down population to the level of the means of subsistence; and the aborigines of America are cited as examples. But America is the very stronghold of the principle of population. There, we are told, the means of subsistence are in such abundance that population requires no check of any kind. But when America has been thus fruitful in the hands of the new settlers, how did it happen to be so miserably barren in those of its first inhabitants? Can any reason be assigned, but that they did not avail themselves of the means which it afforded? No doubt, it will be said that they were ignorant of the arts of civilized life; but did they even practise the arts which were known to themselves, or were they at any pains to discover better? The light of science does not burst, unlooked-for, upon any nation in a sudden blaze of illumination. It is the reward of the incessant toil, not of a single individual or a single age, but of many successive generations, the works of one serving as the platform for his successor. Enough has thus been always revealed to the industrious to supply their present wants, while mines yet remained unexplored to repay the labours of those who have followed. But the indolence of the first inhabitants of America, and of all savage nations, is perfectly admitted by Mr Malthus: Upon what principle, then, can he charge upon Nature that misery which is plainly accounted for by the sloth and negligence of the human race? It is quite conceivable that a man may perish with a feast before him, if he will not put forth his hand to convey the viands to his mouth; and unless Mr Malthus and his adherents are prepared, in such a case, to return a verdict of "died from starvation," it is not easy to see how they can ascribe the distress of the American savage to deficiency of means. It may be perfectly true that their numbers were kept down to a level with the food actually produced, but the population was certainly very much under the amount which might have been maintained by such a use of the means afforded by nature as was within the power even of a savage. This is shewn by the advances which had been made both in Mexico and Peru. It is impossible, then, to deny, that in America, as among the secluded districts of our own country, the wants of the inhabitants did not spring from a deficiency of the means of support, but from neglect to apply these means to their proper use.

---

* Journal of the English Agricultural Society, vol. i. part 1, p. 100.

† Ibid. p. 78.

From savage nations, Mr Malthus turns to those which are more civilized. Among this list Scotland is included, and we shall take the history of its progress as given by himself. "Scotland," he says, "has at all times been subject to years of scarcity, and occasionally even to dreadful famines. The years 1635, 1680, 1688, the concluding years of the sixteenth (seventeenth ?) century, the years 1740, 1756, 1766, 1778, 1782, and 1783, are all mentioned in different places as years of great sufferings from want. In the year 1680, so many families perished from this cause, that *for six miles, in a well inhabited extent, there was not a smoke remaining.* The seven years at the close of the sixteenth (seventeenth ?) century were called *the ill years.* The writer of the account of the parish of Montquhitter says, that of *sixteen families on a farm in that neighbourhood, thirteen were extinguished; and on another, out of* 169 *individuals, only three families (the proprietor's included) survived. Extensive farms, now containing a hundred souls, being entirely desolated, were converted into a sheep-walk. The inhabitants of the parish in general were diminished by death to one-half, or, as some affirm, to one-fourth, of the preceding number. Until* 1709, *many farms were waste. In* 1740, *another season of scarcity occurred, and the utmost misery was felt by the poor; though it fell short of death. Many offered in vain to serve for their bread. Stout men accepted thankfully twopence a-day in full for their work. Great distress was also suffered in* 1782 *and* 1783, *but none died.*"*

Here we observe a progressive improvement from successive years of famine to comparative plenty. In the course of the seventeenth century we see whole districts of country laid desolate. During the eighteenth scarcities also occurred, but not to the same extent. The account of Scotland given by Mr Malthus closes at the date of the former Statistical Reports. For the change which has taken place since that date, we must refer to the abstract from the new Statistical Reports, given in the last Report of our Society. Not only has no year of scarcity occurred in that period at all to be compared with those of former times, but there has been an unparalleled advance in the comforts enjoyed by all classes of the population. Of this, the rise of wages, with no corresponding rise in the price of provisions, furnishes the most decisive evidence.

Mr Malthus admits that, at the date of his work, an improvement had

* Vol. i. p. 465.

taken place in the situation of Scotland as compared with its circumstances at an earlier period; but he says, "a part of this improvement is probably to be attributed to the increase of the preventive check."* This hesitating supposition is quite inconsistent with an admission contained in the second edition of his work. There he declares that the preventive check, "to say the truth, whatever hopes we may entertain of its prevalence in future, has undoubtedly, in past ages, operated with very inconsiderable force."† This he says with the whole history of Scotland before him, as exhibited in the first Statistical Reports. But if the operation of the preventive check could, in his opinion, account for the change which had taken place in Scotland at that time, he could hardly have deemed its force inconsiderable; or if it was inconsiderable, then it assuredly affords no adequate explanation of the admitted improvement in this country. The admission in question is no doubt left out in the subsequent editions, but it still remains uncontradicted, as the conclusion at which Mr Malthus had arrived after an extensive survey of the history of man. But if, up to the time when Mr Malthus wrote, the operation of this check had been inconsiderable, it has been infinitely less since that period. We mentioned in our last report that, from 1755 to 1791, the total increase of the population of Scotland was only 259,336; that from 1791 to 1821, a shorter period by six years, the increase was no less than 578,457, and from 1821 to 1831, it amounted to 272,351; the number added to the population in the course of these ten years exceeded the whole accession in the course of the thirty-six years from 1755. It is quite vain in these circumstances to look to the preventive check for an explanation of the improvement in general comfort, which has confessedly taken place in Scotland. There is but one other mode of accounting for this improvement. If each individual of the present enlarged population has a greater share of all the comforts of life than was enjoyed by each individual of the small population of former times, how can the adherents of Mr Malthus escape from the admission that, however rapid the progress of population may have been, the progress of the means of subsistence has been more rapid still? If, then, in this, as in other matters, our expectations for the future are to be governed by the analogies of the past, we must conclude, that if man shall do his duty the means of subsistence will keep pace with the increase of the race to the end of time.

Again, Mr Malthus says, "Scotland is certainly overpeopled, but not so much so as it was a century or half a century ago, when it contained fewer inhabitants."‡ Here is another admission that the means of subsistence had increased faster than consumers: but is the alleged redundance of population at either period more than mere assumption? No doubt the misery suffered in this country in early times must in part be ascribed to the indolence of the inhabitants; but they also laboured under inconveniences peculiar to their situation. We must again advert to the distinction between savage and civilized life. In the former state, even the ablest are frequently reduced to severe privation; but those

* Vol. i. p. 453. † 2d edit. p. 384. ‡ 6th edit. vol. i. p. 469.

who have not the universal talents required for supplying the savage with the barest necessaries of life must actually starve. In more civilized times, again, it is enough for a man if he can perform any one kind of work, however simple, and many are enabled to earn a comfortable livelihood, who, in the savage state, could not have maintained themselves for a month. A man who could never have made a joint-stool may contrive to exist by gathering chips. But a considerable population is necessary for this. There must not only be a sufficient range to give constant employment to the carpenter who furnishes the chips, but to the other classes who purchase them. Deprive the poor chip-gatherer of either, and his occupation is gone. He is as helpless as he would have been among savages. But the majority of men are not fit for great works, or for a variety of employments of any kind either small or great. Most of the chip-gatherer's customers are somewhat in the same situation as himself. They could nearly as little have coped with the difficulties of savage life; and it is only by the simplification of labour arising out of its division that it is possible for them to find work of any kind adapted to their powers. Now, at the earlier period to which Mr Malthus refers, Scotland was altogether destitute of the minor employments, and those of the population who were fit for nothing else of course remained a burden upon their neighbours. At the period, again, when Mr Malthus wrote, the country had made some progress: through the division of labour which had then taken place, a considerable portion of such persons had found work to which they were equal; and the still greater division of labour which has occurred since that time has provided for a still greater portion of this class. But no part of this improvement could have been brought about without an extended population; and in place of the sufferings of former times having arisen from a redundance of numbers, they were in fact the necessary consequence of the smallness of the population, which rendered the profitable application of its labour impossible. This appears to us a perfectly satisfactory explanation of the manner in which the improvement was brought about in the state of Scotland which Mr Malthus observes. But, on his own principles, the thing is quite inexplicable.

We must then regard the whole theory of Mr Malthus as a mere delusion. In the preface to the second edition of his work, he says, "The essay on the principle of population which I published in 1798 was suggested, as is expressed in the preface, by a paper in Mr Godwin's Inquirer. *It was written on the impulse of the occasion, and from the few materials which were within my reach in a country situation.*" The subject was certainly not one on which the opinion of any man, however able, could be of much weight when pronounced thus hurriedly, and with such scanty means of investigation. Coming, however, as an answer to the monstrous doctrines of Godwin, the work was well received; and it can excite no surprise if the subsequent inquiries of Mr Malthus were in some degree biassed by the opinion to which he was thus committed, and which had obtained such general approbation. This is only supposing him to have been subject in some degree to a weakness from which even judicial wisdom has not been considered altogether exempt. In the late alterations of the Scottish judicatures, it is assumed by the Legislature that a judge is incapable of bringing his mind to an impartial review of his own decision; and in our Church courts the principle is carried still farther. Not only is it held that a judge is irremediably blind to the errors of his first opinions, but that he is entitled to feel all the zeal of a party to have these opinions confirmed, and every year presbyteries and synods are to be seen at the bar of the General Assembly, not for the purpose of explaining the grounds of their judgments, but struggling, with the aid of feed counsel, in behalf of the sides which they have espoused. If, then, Mr Malthus had committed mistakes at first, he was certainly not in a favourable situation for rectifying them afterwards. This may account for his authorities not bearing out his conclusions, and for his imagining that he finds illustrations of his principles in phenomena which admit of being traced to other causes.

But perhaps it may be said that the cities of Edinburgh and Glasgow are exceptions to the general prosperity of Scotland; that in them the theory of Mr Malthus obtains, and population has outstript the means of subsistence. Dr Alison, adopting the general principles of Mr Malthus, of course holds that they apply here,—that distress is yearly increasing in both of these cities, and this distress arises from a deficiency of means to support the increased population.

There can be no doubt of the existence of much misery both in Edinburgh and in Glasgow; but whether that misery is greater now than it was in former times; and whether it arises from an absolute deficiency of the means of sustenance, are questions which may fairly admit of dispute. The circumstances from which Dr Alison draws these inferences would hardly appear to warrant the conclusion.

The increased provision for the destitute in Hospitals and otherwise is certainly no symptom of increasing want. It is the natural effect of an accumulation of wealth. It will not be said that the sufferings of the most destitute of the present day are at all to be compared with those which affected almost all classes during the "ill years" at the close of the seventeenth century. Yet, were the distresses of the two periods to be measured by the numbers received in hospitals, Scotland would appear to have been at that time perfectly free from every ground of complaint. The increasing mortality of the population at large, if correctly ascertained, would be a much more certain proof of the alleged deterioration. As to Glasgow, it seems to be admitted by Dr Cleland, in the paper submitted by him to the last meeting of the British Association, but there is much reason to doubt the accuracy of Dr Alison's information so far as regards Edinburgh. He is certainly wrong in supposing that the burial grounds of Edinburgh are each appropriated to particular districts of the city. All of them, including those of the West Church, Newington, the Calton, Canongate, &c., are used indiscriminately by the whole population; and thus no idea can be formed of the state of the mortality of the city, without an examination of the whole. He has also confined his attention to one or two years of extraordinary sickness, which cannot be accounted a fair test of the general health. We have gone over the Registers from 1821 to 1840, and made as accurate a table of the deaths of each year as we could. It has not, however, been checked, and we cannot therefore pretend to say that it is free of mistakes. Independent also of the errors which we may have committed ourselves, it is imperfect in some respects from different systems being adopted in keeping different records. Most of them begin the year at the 1st of January; but, for the whole period of the table, the record of the Canongate begins the year at the term of Whitsunday; and this also is the case in the record of the Greyfriars' from Whitsunday 1836. In one of the records a blank occurs after June 1835, in consequence of a change of recorders. This we have been obliged to supply by assuming the entries in that record, for that year, to have been the same as for the year preceding. But although the table has thus no pretensions to perfect accuracy, it may give some indication whether the mortality of the city, on the whole, is increasing or diminishing. We have inserted in it a statement of the spirit licenses issued in Edinburgh, and of the spirits consumed in Scotland, to which we shall refer afterwards. The Table is as follows:—

TABLE *shewing the Mortality of Edinburgh for Nineteen Years, the Spirit Licenses issued in Edinburgh for Nine Years, and the Quantity of British Spirits which has paid Duty in Scotland for Home Consumpt for Seventeen Years.*

YEARS.	Deaths in Edinburgh.	Number of Licenses issued in Edinburgh.	Number of Gallons of British Spirits consumed in Scotland.
1821	3021		2,229,435
1822	2998		2,079,556
1823	3541		2,232,728
1824	3496		4,350,301
1825	4140		5,981,550
1826	3845		3,988,788
1827	3581		4,752,199
1828	3880		5,716,180
1829	3456		5,777,280
1830	3793	997	6,007,631
1831	4008	949	5,700,689
1832	5485	816	5,407,097
1833	4652	827	5,988,556
1834	3950	819	6,045,043
1835	3883	811	6,013,932
1836	4584	797	6,620,826
1837	3997	736	6,124,035
1838	4282	690	
1839	3768	663	

It will be observed that this table shews a regularly decreasing mortality for the last three years; and although Dr Alison says, that during the year 1839 the city was affected with epidemic fever, the deaths of 1839 were less numerous than those of 1830, 1834, and 1835, when no such complaint prevailed.

Assuming, however, that there has been an increased mortality both in Glasgow and Edinburgh, it still does not follow that this must have proceeded from a deficiency of the means of subsistence. The state of wages demonstrates, in the clearest manner, that in the large cities, as well as in the country generally, the means of subsistence have, for the last fifty years, advanced much more rapidly than the number of consumers. The tailors, for instance, who are among the most numerous trades of Edinburgh, now receive 2s. 2d. for the same work which, from 1790 to 1799, yielded them only 1s. 6d. The average price of oat-meal, according to the Edinburgh fiars, for seven years from 1790, was 16s. $7\frac{4}{7}$d. per boll; and for seven years, ending with crop 1838, it was 16s. $8\frac{1}{7}$d. The Edinburgh tailors thus command about thirty per cent. more of the necessaries of life at the present time than they could obtain in 1790. Dr Alison compares the present condition of the lower orders with their condition thirty years ago. If we look at the wages of the tailors in 1810, we find that they were then paid 2s. 4d. for the above work, but the average price of oatmeal for seven years from 1810 was 22s. $3\frac{2}{7}$d. per boll; so that their situation then was not much better than in 1790. The shoemakers are also a numerous trade. For the work which now yields them 3s. they received no more than 1s. 4d. in 1792, and 2s. 9d. thirty years ago. The printers are said to be more numerous than the shoemakers. They now receive $4\frac{1}{2}$d. for the work which yielded them only 3d. prior to 1791. No alteration has taken place in their wages for nearly forty years; but the fall in the price of provisions has for thirty years been operating a gradual change in their favour. Cabinet-makers are now receiving fifty per cent. beyond the wages of 1790. Thirty years ago they received about ten per cent. more than at present, but this was nothing like an equivalent for the higher expense of living. Masons, who are now receiving 20s. per week, received no more than 10s. in 1790, and 23s. thirty years ago. House-carpenters in 1790 received 9s. per week; they now receive 18s., and thirty years ago they received 20s. Common labourers received 7s. per week in 1790; 15s. in 1810; and now we are informed that 13s. would be a fair average. We have been favoured with this information by tradesmen of the first respectability, and most of it is taken from their books. It is unnecessary for us to go over the other trades. It is evident that an advance like this could not occur in the wages of the leading employments of the place, without a corresponding advance in the wages of every other branch of industry.

We have not had it in our power to ascertain the changes which have taken place in the wages of the different kinds of labour in Glasgow, but it is quite certain that, if wages had not undergone a greater rise there than in the rest of Scotland, there never could have been the influx of new inhabitants into Glasgow which is indicated by the extraordinary increase of its population. Accordingly, Mr Sheriff Alison states, that the average wages of the skilled operatives of Glasgow are "more than double of the average earnings of labourers over Scotland";* and these, we know, have risen from 50 to 100 per cent. in the course of the last fifty years.

If the inhabitants of Edinburgh and Glasgow, then, are in a worse condition now than thirty years ago, this cannot arise from the means of subsistence having failed to keep pace with population, since, in every department, the same amount of labour commands a much greater quantity of the comforts of life now than it did at that period.

In our last Report we stated that the suffering which exists in Glasgow and other places of trade was, in our opinion, to be ascribed not to the want of means, but to the "total mismanagement of these means after they have been realized." We thought then, and we think still, that intemperance has been the leading cause of all their misery. That this vice has been prodigiously increasing in Scotland, of late years, cannot admit of the slightest doubt. The statement of the quantity of whisky which has paid duty for home consumpt, contained in the preceding table, is taken from Mr M'Culloch's Commercial Dictionary, down to the year 1835. For the two subsequent years it is taken from the Edinburgh Almanac. Both authorities found on Government returns. It appears from this table, that the legal consumpt of Scotland prior to 1824 scarcely exceeded two millions of gallons annually. The quantity of illicit spirit then used was, no doubt, very great, but its amount does not admit of being accurately ascertained. A large reduction of duty took place in 1823, which had the effect of putting an end to smuggling; but the legal consumpt soon rose to a much larger amount than the whole previous consumpt, both legal and illegal. For a number of years it has never been under six millions of gallons; and in the year 1836 it amounted to 6,620,826. This at 15s. per gallon, which is stated by Mr Alison to be the ordinary *retail* price,† must have cost the consumers about L.4,965,620, which is just about the amount of the whole revenue of Scotland. Mr Alison's situation as Sheriff of the county of Lanark, gave him the best opportunity of obtaining correct information as to the proportion of this expense which attached to Glasgow, and, after the most careful inquiry, he has set it down at not less than L.1,200,000.‡ The spirit-shops, which in 1830 amounted there to one for every twelve houses, he says now amount to one for every ten. "Ten or twenty thousand workmen are more or less intoxicated every Saturday, and for most of Sunday. Every farthing which can be spared is too often converted into ardent spirits."‖ Mr Alison's account may be held as confirmed by the Committee appointed to investigate the causes of the increase of assessment in Glasgow, their report bearing, "that the prevalence of intemperance in this city seems likely to undermine the whole fabric of society," and that "it is rapidly extending among those of early years of both sexes."§

---

* Alison on Population, vol. ii. Ap. A. † Ibid. ‡ Ibid. ‖ Vol. i. p. 191.

§ Dr Alison's Management of the Poor, p. 182.

These habits could not fail to issue in destitution. The enormous sum stated by Mr Alison to be thus expended in Glasgow, would of itself account for all the misery of the place. Dr Alison is of opinion that L.800,000 would suffice to put the whole poor of Scotland on a par, in point of comfort, with the poor of England; and a half more than that sum, we find, is consumed in ardent spirits by a single city, not containing an eighth part of the population of the kingdom. Yet this sum, immense though it be, does not exhibit the total amount of the sacrifice. We must also take into account the articles purchased at considerable expense, which go for next to nothing to the old clothes men and pawnbrokers. It was stated by Mr Porter, at the late meeting of the British Association, that in Glasgow and its suburbs there are about 700 pawnbrokers, who transact business to the extent of about half a million of money in the course of the year; that the amount advanced on a pledge frequently does not exceed ½d.; that the average advance is not more than 4d.; and that the rate of interest exacted is not less than 433⅓ per cent. The money thus obtained is either employed in gratifying the tyrant propensity of the borrowers, or in supplying what ought to have been provided by the money which it has cost them. "The same individuals, who a year before were reduced to pawn their last shreds of furniture to procure subsistence, recklessly throw away the surplus earnings of more prosperous times in the lowest debauchery."* They are, of course, again driven to the pawnbrokers whenever bad health, a stagnation of trade, or any other interruption of employment, overtakes them.

With all this before us, surely the pauperism of Glasgow may be accounted for, without resorting to the Malthusian doctrine of want of means to support the growing population. But, if further evidence shall still be deemed necessary to shew that intemperance is there the leading cause of destitution, we have it in the circumstance that the most pauperized districts of the city are the favourite settlements of the spirit-dealers. Nothing can be more revolting than the picture of the wynds given by Dr Alison from the work of Mr Symonds:—"A labyrinth of lanes, out of which numberless entrances lead into small square courts, each with a dunghill reeking in the centre."—Yet this scarcely a preparation "for the filth and destitution within;"—the lodging-rooms exhibiting "a whole layer of human beings littered along the floor, sometimes fifteen and twenty, some clothed, some naked, men, women, and children, huddled promiscuously together," of course confirming each other in every species of depravity.†—One would imagine that such a neighbourhood could afford no attraction to tradesmen of any kind. Yet spirit-dealers are to be found in all parts of it; and they possess considerably more than a third of the shops of the portion of the Bridgegate into which the wynds open, and which forms the ordinary rendezvous of their inhabitants. Sometimes establishments of this kind are to be seen in clusters of two and three without an interval. Out of sixty-three shops

* Mr Alison, v. i. p. 191.

† Dr Alison's Management of the Poor, p. 13.

which occupy this part of the street, twenty-six are devoted to the sale of spirits, either exclusively or along with other articles. The old clothes shops are next in number, and amount to eleven. Why is it that these classes of traders shew such a predilection for the abodes of poverty and vice? Not surely because they give a preference to poor and disreputable customers. One would say that it would be more for their advantage to fix themselves in parts of the city occupied by people of substance and character. Can any reason be assigned for this but that such persons do not frequent their shops, and that it is by the very lowest of the population that the trade is maintained?

Were the sums expended in spirits of moderate amount, we could agree with Dr Alison that the spirit shop is only the last resource of despair; but when, without taking into account the losses by pawnbrokers and old clothes men, we find the amount thus paid in Glasgow alone so much exceeds what Dr Alison deems sufficient for supporting the whole poor of Scotland, and when we find that the wages of Glasgow are double of the wages of the rest of the country, we are forced to conclude that the destitution which prevails in that city is not to be ascribed to want of means, but chiefly to the dissolute habits of the population.

The increasing mortality of Glasgow, in Dr Alison's opinion, arises from destitution, and if this destitution is produced by intemperance, intemperance becomes the ultimate cause of the increased mortality. But we may be allowed to ask if it does not exercise a more direct influence in undermining the health of the population? Dr Alison does not say that the use of ardent spirits is harmless if carried to a great extent. His opinion seems to be, that it has not, in general, gone to excess. The Glasgow Committee, however, declare, that, as a consequence of the general prevalence of intemperance, "health is destroyed." Nor are the victims of this vice the only sufferers. The misery extends to all who are dependent upon them. The Glasgow report goes on to say that industry is "neglected; idleness and improvidence cause every domestic claim to be disregarded; aged parents are abandoned in their helplessness; families are left to endure the miseries of nakedness and hunger."* We cannot, then, be wrong in saying that to the direct or indirect operation of this cause must be ascribed most of the destitution, and much of the increased mortality, which Glasgow now exhibits.

Intemperance, however, will by no means account for the increase of these evils in Edinburgh, if it shall be found that they actually are increasing, for it appears that, during the last nine years, there has been an annual falling off in the spirit trade of that city. A statement of the spirit licenses, issued in each of these years, is given in the table as entered in the books of the city clerks, and from this statement it will be seen, that while the number of licenses issued in 1830 was 997, the number issued last year was only 663, so that a diminution has actually taken place to the extent of 33 per cent. The reduction may have arisen in part from the authorities having become more scrupulous in granting licenses; but that will not account for the whole of the difference, for the number of claims rejected last year amounted to no more than 51. The chief cause of the reduction has undoubtedly been a change in the taste of the inhabitants, and we are informed by those in the trade that it continues to become less and less profitable.

---

* Report of Committee, p. 5.

But although in Edinburgh the evils arising from intemperance are evidently on the decline, it cannot be denied that they are still great. There also, as in Glasgow, the spirit shops are most numerous in the most destitute districts. A great portion of what is given to the begging poor is consumed by these shops. This of course will not be discovered from the keeper of the lodging which a beggar presently occupies, such persons depending for their own subsistence on what their lodgers may collect. But a beggar seldom remains many weeks in the same place, and the keeper of any lodging which he has left has no scruple in telling the whole truth.

If we inquire again into the character of the permanent poor of the city, we shall equally find that intemperance has in general been the origin of their poverty. We are indebted to the Rev. Mr Bowie, the chaplain of the Edinburgh Charity Workhouse, for the following state of its inmates at 1st July 1840.

TABLE *shewing the number of Paupers in the Edinburgh Charity Workhouse at 1st July 1840, with the trades of the men, and the trades which had been followed by the husbands, of such of the women as are widows.*

TRADES.	Men.	Women.
Wheelwright, tinsmith, innkeeper, one each,	3	0
Musician, combmaker, flower-dresser, dyer, do.,	4	0
Surgeon, coachmaker, do.,	2	0
Shepherd, farmer, cook, brassfounder, one widow of each,	0	4
Land-measurer, tobacco-spinner, flax-dresser, one widow of each,	0	3
Bleacher, slater, hatter, brushmaker, do.,	0	4
Sawyer, marble-polisher, gardener, one of each, and one widow of each,	3	3
Mason, collier, teacher, candlemaker, sheriff-officer, two widows of each,	0	10
Clerk, silversmith, flesher, carver, one of each, and two widows of each,	4	8
Blacksmith, cabinetmaker, sailor, one of each, and four widows of each,	3	12
Grocer, carter, one of each, and three widows of each,	2	6
Merchant, painter, three of each, and three widows of each,	6	6
Carry over,	27	56

TRADES.	Men.	Women.
Brought over,	27	56
Tailors,	10	18
Shoemakers,	16	23
Weavers,	6	7
Labourers,	8	9
Porters,	4	11
Soldiers,	1	16
Carpenters,	2	7
Turners,	3	1
Servants,	8	17
Ropemakers,	0	3
Clockmakers,	3	0
Plasterers,	4	3
Booksellers,	2	0
Printers,	2	2
Married women whose husbands are in the house and contained in this list,	...	12
Unmarried females,	...	89
Men unaccounted for,	5	...
Women, do.,	...	39
	101	313
Total, 414		

The first column of this Table exhibits the number of men in the establishment at the above date, the second exhibits the number of women. Of the women, it will be observed, that eighty-nine were unmarried, twelve were married, and their husbands were then with them in the house; thirty-nine were unaccounted for; all the remainder were widows. Opposite to the numbers in these columns are given the trades of the men in the establishment, and of the husbands of the widows. This statement, then, may be considered as shewing with considerable accuracy the proportion in which the different trades become chargeable on the poor rates of the city.

We have already mentioned that the printers are one of the most numerous trades in Edinburgh. But it will be observed that, notwithstanding of this, only two men of that trade were then in the workhouse; and although it is by no means reckoned a healthy occupation, and the hours of labour occasionally extend to eighty in one week, the number of their widows then in the establishment was no more than two also. We are informed that the printers are in general well conducted. In some houses they receive their wages at two o'clock, and return to their work after dinner, as on other days. Yet at no very remote period "a drunken printer," we are informed, was almost proverbial among the other trades. We have been told by a very intelligent member of the body, that much of the change is to be ascribed to the variety of interesting amusements which have been provided of late years for the working classes of this city in libraries, lectures, &c. We noticed in our last report the exertions which have been made by some of the master printers in behalf of their workmen. No means could be adopted more likely to bring about the improvement which has actually taken place; and it is gratifying to see that they have not only had the effect of securing regularity in business, but of preserving to so great an extent the comfort and independence of the whole trade.

The condition of the shoemakers is remarkably different. Although they are believed to be less numerous than the printers, we find no less than sixteen men and twenty-three widows sent to the workhouse by this trade. The tailors also form a heavy burden upon the funds, being no less than ten men and eighteen widows. The total number of tailors in Edinburgh is nearly double that of the shoemakers, extending to from 1500 to 2000, and the charge brought by them on the workhouse would no doubt have been much greater, but that many of them come from the country for a time, and leave the city without obtaining a settlement. The circumstances of both shoemakers and tailors are very nearly the same. Both receive their wages on Saturday evening, and on the early part of Monday very generally they have nothing to do. Having thus both time and money at their disposal, it too frequently happens that both are misapplied, and work is not resumed till their funds are exhausted. A practice also obtains very generally among tailors of paying the whole wages for executing a piece of work to an individual workman, leaving the rest who have been employed on it to draw their money from him. This almost inevitably drives them to a spirit shop to make the division, and there, not unfrequently, the whole is consumed. The same practice was at one time followed by the shoemakers, and with precisely the same effect. As the small amount of pauperism among the printers is to be ascribed to their comparative sobriety, so we are surely entitled to conclude that a great share of the poverty of both shoemakers and tailors is to be traced to their intemperance. Their present habits must of necessity incapacitate many for work long before the natural time, and cut off a still greater number, leaving their families a burden upon the public. But as the improvement among the printers has been in a great measure brought about by the excellent management of the masters, so we are happy to hear that there is a prospect of a similar reformation being effected among the tailors and shoemakers in the same way. Some master tailors, we understand, make it their study to have work provided on Monday morning for all their hands, and the conduct of their men, we are informed, has become as exemplary as that of the printers.

It would require more time and space than we can afford to go into a full examination of the other trades. Much instructive information would, however, certainly be obtained by such an inquiry. Indeed, the proper remedies for destitution are much more likely to be discovered by studying in this manner the habits of each particular class, than by attempting to deal at once with the entire mass.

There is too much reason to think that, although pauperism has not reached the same height in Edinburgh as it has in Glasgow, it proceeds in both cities to a great degree from the same cause. It was stated in evidence before the Committee of the House of Commons on Drunkenness, upon the authority of the Treasurer of the Edinburgh Charity Workhouse, "*that the greater part of the money paid by him to the poor, and raised by public assessment, finds its way into low tippling shops.*"* These habits have certainly not been acquired merely since the individuals have been reduced to poverty. No doubt their wages, when they were able to work, must have gone in the same way, and a larger provision from the public bestowed upon them in the form of money would share no better fate.

The statement of the number of deaths in Edinburgh exhibited in the preceding table, appears to shew a connection between intemperance and mortality there as well as in Glasgow. The effect of the reduction of duty would probably be most visible soon after it took place. There can be little doubt that Edinburgh would then have its full share of the increased consumpt. We have already seen that the legal consumpt of spirits in Scotland rose in 1824 to 4,350,301 gallons. This was more than double of the former legal consumpt, but as it had the effect of superseding the contraband trade, the absolute addition in that year could not be very great. Certainly it was not attended in Edinburgh with any additional mortality; but in 1825 the consumpt of the legal spirits rose to 5,981,550 gallons, and the deaths in Edinburgh, which in 1823 had amounted to 3541, and in 1824 to 3496, rose in 1825 to 4140. There was no epidemic in 1825 to account for this great addition to the number of deaths, nor does there appear to have been any other cause but the prodigious increase of intemperance. We are informed by Dr Alison, that an epidemic fever broke out in Edinburgh in 1826, which continued for three years; yet, notwithstanding of this, the deaths of 1826 amounted only to 3845, and of 1827 to 3580; but the consumpt of spirits in Scotland, in consequence of a small additional duty, fell in 1826 to 3,988,788 gallons, and in 1827 it was still only 4,752,199. After the first years of the reduced duty, the general consumpt of Scotland can give no indication of the consumpt of particular places. In Glasgow, for instance, it has been increasing, while in Edinburgh, as far back as our state of licenses goes, it has evidently been declining. But the coincidence which we have noticed, of the increase and decrease of mortality with the increase and decrease of the quantity of spirits consumed immediately after the change of duty, is certainly striking, and would lead one to think that they were not unconnected.

It is observed by Dr Alison, that the heads of families are the most frequent victims of epidemic disease, and this is precisely what we should be led to expect. We believe it is universally admitted, that the body is never more predisposed to disease than when in the state of lassitude which succeeds a debauch. The whole means of the family necessarily pass through the hands of its head, and as he has most in his power, we cannot be surprised if he is in general the greatest transgressor, and, as a necessary consequence, the most frequent sufferer. The state of the Charity Workhouse of Edinburgh shews that the remark does not apply in the same degree to every trade. We have already seen that, while the shoemakers have twenty-three widows in the establishment, the more numerous trade of printers have only two. Will the sobriety of the one trade, and the intemperance of the other, not account for the difference?

---

* No. 4666.

We cannot help thinking, that the comparative exemption from epidemic fever which Dr Alison says is enjoyed by the great towns of England, ought to be ascribed to the same cause. If in Scotland the chief sufferers from fever were the "lone women" and others in destitute circumstances, there would be good reason for holding Dr Alison's supposition to be correct, that their liability to infection was the consequence of their weak state of body, arising from want of the necessaries of life; and that, on the other hand, the plentiful supply afforded to the English pauper has been his protection. But if the most valuable lives are the chief victims; if with us those who are carried off are in general persons who are not only maintaining themselves, but families, it is plain that destitution will not account for the calamity. Dr Alison acquiescing in the evidence adduced before the Committee of the House of Commons, admits "that drunkenness is more prevalent in Glasgow, and other great towns of Scotland, than any where in England."* Indeed, from the state of British spirits consumed annually in England, given in Mr M'Culloch's Commercial Dictionary, it appears that the total amount never exceeded 7,759,687 gallons; while we have seen that the consumpt of the small population of Scotland for a single year has been as high as 6,600,000. If the difference, then, between the mortality among the shoemakers and the printers of Edinburgh is to be ascribed to the different habits of these trades, will the same cause not account for the difference which is observed between England and Scotland in liability to epidemic fever?

Nor are we to conclude that intemperance has had little effect in increasing the mortality of Scotland, because many have been cut off at an early age, before they could have acquired a taste for such indulgence. One of the most affecting consequences of this degrading vice is the "disregard of every domestic claim" to which it necessarily leads. We were informed by a missionary whom we met in the course of these inquiries, that in the district of Edinburgh which was under his charge no less than three instances had occurred of children *actually overlaid by their parents while in a state of intoxication.* How many may have sunk under the "miseries of nakedness and hunger" recorded by the Glasgow committee it is impossible to say!

---

* Dr Alison's Management of the Poor, p. 112.

We were in hopes that this subject would have been undertaken by the society which was formed, in consequence of Dr Alison's work, for the purpose of investigating the condition of the poor of Scotland, with a view to devising means for their relief. The matter was brought under the notice of that body, and we understand that they were at first disposed to give it a share of their attention. The idea, however, appears to have been soon abandoned. We fear that the question involved was not presented with sufficient distinctness to impress them with its paramount importance. If the distresses of Scotland arise from an imperfection in the constitution of man;—if the only cure of that imperfection is what Mr Malthus has suggested; and if he is correct in saying that his specific has "undoubtedly, in past ages, operated with very inconsiderable force," we can have small hopes from its operation in time to come, and must regard the evil as beyond the reach of human remedy. But if the distresses of Scotland are to be traced to an imperfection which attaches only to particular classes, or particular individuals, and which has already been overcome by a large portion of the population, our situation is by no means so desperate. What has been done by many may be done by still more, and there is a fair prospect of ultimately effecting a cure. Though we have formed a very decided opinion upon the subject, we by no means pretend to say that our views are correct. If we have acquired any thing from the works of those who have written upon it, it has been an utter distrust in our own judgment. When we see that their distinguished talents have not secured them from mistakes while following the ignis fatuus of a theory, we can have little confidence in our own steps. We can of course have seen but a part of so extensive a field, and, like others, we may have looked most intently at what seemed most to favour our own opinions. Some of our inferences are drawn from numbers, and a mere slip of the pen may have led us into serious error. But with whatever hesitation we present the results of our investigations, we can have none in saying, that to have the question authoritatively settled is a matter of national importance.

For the present we must assume that our own conclusions are correct, and that intemperance is not merely one of the causes of the destitution and untimely mortality now prevailing in the great towns of Scotland, but that it is the leading cause of these calamities. If this be the case, relief of present distress is by no means all that is wanted. So long as the same habits continue we must have the same succession of objects soliciting our sympathy; and the very first point requiring attention is the reformation of these habits.

As the reduction of the spirit duty had a great effect in bringing the evil upon us, it would seem to follow, that were the duty again raised an improvement might be expected. It will of course be said that the door would then be again opened to the illicit trade. That, however, is by no means certain. A great change has taken place in the public mind on this subject, and many who twenty years ago would have joined in resisting the revenue officer would now give him their hearty support. But although the certain consequence were to be that smuggling must again become as formidable as it was in former times, are we prepared to say that it would be a worse misfortune than those under which we now suffer? The financier no doubt pronounces, without hesitation, that the reduction of duty has worked like a charm. He does not see the "aged parents abandoned in their helplessness;"—"the families left to endure the miseries of nakedness and hunger;"—the infant smothered by its own besotted father. He does not witness the raving anguish of the wretched man when he first awakes to consciousness, or the gnawing remorse which haunts him to the grave. Yet that these have been among the effects of the reduction of the spirit-duty we have upon evidence which cannot admit of question. Nor are such calamities of rare occurrence or confined only to a few. We have it proved before a Committee of the House of Commons that the whole of the great towns of Scotland, containing, according to Dr Alison's estimate, a half of the population of the country, are suffering from this cause; and we find gentlemen upon the spot, with all the partiality of Scotsmen, compelled to acknowledge, as the result of a most careful investigation, that the vice of intemperance is threatening "to undermine the whole fabric of society" in our commercial metropolis; involving at once physical destitution in all its most aggravated forms with a moral desolation still more appalling! Who will say that such wholesale evils are for a moment to be compared with an occasional encounter between a smuggler and a revenue officer, or any of the other mischiefs of the illicit trade?

These are considerations for the statesman. But can private individuals do nothing? Nay, we may rather ask, can they not do infinitely more, in a matter of this kind, than the Legislature of the country? Established habits, and the contaminating influence of bad example, are not to be abolished by act of Parliament. But while the stern inflictions of the law are exercised in vain, we see at this moment a single individual, without the aid of fortune or high station, effecting in the neighbouring island a change upon the national character of which the boldest legislator would never have dreamed. If it shall prove permanent we shall hardly say that the age of miracles is past! Such powers, however, belong to few. Ordinary experience would lead us to think that, in ordinary hands, something more is wanted than a mere address to reason. The firmest resolves of moral principle have too frequently been no more than temporary restraints. Propensities of this kind have been seldom completely overcome without calling in the aid of opposite propensities of a higher order to occupy their place. It generally happens that in this, as in the case of other maladies of which the mind itself is the seat, to effect a cure, the current of thought must by gentle means be turned from its devious course, and taught to run in a better channel. "The French were once exceedingly addicted to intoxication; their rulers enacted many and severe laws to repress the habit—destroying all the vines of the country—imprisonment—whipping—cutting off the ears of those found intoxicated, were successively resorted to, but with little effect towards arresting the evil. The age of Louis XIV., by creating a taste for intellectual and refined pleasures, did more to arrest intemperance in France than all the laws of former rulers."* In most parts of that country excess of this kind is now altogether unknown. "As respects intemperance in England, if we go back but one hundred years we shall find it far more general than at present. One hundred years ago there was scarcely a shop in London where intoxicating liquors were not kept for sale. The physicians of London at that time stated to Parliament that the victims of intemperance were exceedingly numerous; and this caused the number of dram-shops to be limited by law." † The reduction of the number of dram-shops may have contributed to bring about the change which England now exhibits, but unquestionably the improved taste of the present age has done infinitely more.

In the same manner, it is impossible not to regard the falling off in the spirit trade of Edinburgh, as a direct consequence of the higher cultivation of the inhabitants. This is the opinion of persons intimately acquainted with the habits of the working classes; and it is not a little gratifying to find, that what are shewn alike by reason and by the history of other countries to be the most certain means of overcoming the evil, are not only in operation among us, but that they are already producing such powerful effects.

The measures so auspiciously begun, we have no doubt will be prosecuted with increasing energy. The master tradesmen, not merely for their own interests, but for the interest of those dependent upon them, will spare no pains to put their establishments upon the best possible system. Without this, all attempts at improving the character of the operatives must be fruitless. But while it is the business of the master to superintend the men when under his employment, and although he can do more than any one else in regulating their general conduct, experience has shewn that the rest of the community may render important service by providing proper occupation for their idle hours. Besides the dexterity of hand which a tradesman acquires in the workshop, if he would wish to rise to excellence, he must also acquaint himself with the *principles* of his trade, and there can be no better relaxation from his bodily fatigue than this labour of the mind. It almost in every case conducts to some branch of science, and has frequently led to important discoveries. Thus, the study of the structure of the human foot, suggested to Mr Dowie a valuable improvement on the construction of shoes, which would never have occurred to a man ignorant of every thing beyond his awl; and by attending to the entire form, Mr Macdonald was led to the invention of an instrument for measuring the human body, which admits of being applied to important scientific purposes. Both inventions were communicated to the Edinburgh Society of Arts, and were honoured by that body with distinguished marks of their approbation. We select them from many other communications equally creditable to the tradesmen of Scotland, as shewing what may be done in vocations not generally supposed to have much connection with science.

---

* Remarks on the Influence of Mental Cultivation, &c., by Amariah Brigham, M.D. Fraser & Co. Edin.; Washbourne, London, p. 67.

† Ibid.

The prosecution of such studies may be regarded as not only a complete security against the attractions of the tavern, but the best preparation for instruction of a still higher kind. It is a subject of deep regret with many of our most exemplary ministers, that they have no means of approaching those of their flocks who most need their aid. They do not attend religious assemblies of any kind, either established or voluntary. They will not even meet for such purposes in private houses; and what can be expected from a single visit of a clergyman in the course of a year, when counteracted by the daily solicitations of vice? We do not say that any general change is to be looked for on persons whose habits are thus confirmed. But were their sons withdrawn from this noxious atmosphere, and engaged in any branch of useful study, how easy would it be to prevail upon them from meeting in the lecture-room, to meet for these all-important objects, and "look from Nature up to Nature's God."

Thus far there can be no difference of opinion. All will admit that a taste for mental improvement will overcome these gross inclinations. All will admit that this taste is hardly to be acquired by men in this rank of life, unless facilities are afforded by persons in a higher sphere. These being provided, there is no doubt that, sooner or later, they will produce their effect; but if means shall not also be taken to stimulate the ambition of the humbler classes, it may be long before any general change shall be produced. This is certainly not impracticable. Many have been inspired with this generous spirit under far more untoward circumstances. Mr Alison instances the case of transported convicts.* It appears, he says, from official returns, that out of 18,531 sent to New South Wales prior to 1821, 6000 had gained their liberty, and realized property to the amount of L.1,500,000.† This was certainly not the effect of the mere change of climate; still less was it the effect of change of society, for their new associates were more exclusively bad than those with whom they had been previously connected in this country. Neither can we suppose their former habits to have been overcome by the compelled regularity and exertion of their new life. But in New South Wales, a return was offered to their industry far beyond what they could have obtained at home; and a clear road to comfort and respectability being thus opened up to them, their dishonest propensities yielded to the more powerful influence of an honourable ambition. Mr Alison also instances the equally astonishing change produced, precisely in the same way, upon men of fashion, when removed from the selfish and spiritless frivolities of a town life, and placed in scenes of danger, intrusted with important political duties, or compelled to act on their own responsibility in other trying situations. "Talent, hitherto dormant, is awakened,—*ambition, as yet unfelt, is roused,—hereditary glories are recollected,—and the idlers of the metropolis are transformed into the heroes of Hougumont* *." But without any such violent change of circumstances, we have seen this spirit kindled in individuals who were living in a state of stagnant indifference even more hopeless. We need look no farther for examples of this than the change which the Highland and Agricultural Society are effecting on the Scottish peasantry; their slovenly habits giving place to a laudable pride in the neatness of their domestic arrangements, and the indolent Highlander impelled to exertions so far beyond his powers, that he is carried fainting from the field. Can we entertain a doubt that, if the same stimulus were applied to the town's tradesman before his taste has become habitually depraved, he would put forth his utmost strength; and when our Glenkens tradesmen, from aiming at mere operative dexterity, have been carried on to the study of pure mathematical science without the aid of a teacher, can we imagine that the town's tradesman, who has enjoyed the gratification of merited applause, or in whom even the desire for it has been awakened, would fail to avail himself of every means of information placed within his reach? Unquestionably all who feel within themselves the power of rising above their present condition, would take advantage of the opportunity thus afforded, and it is from such persons that the mass takes its tone. We may at least be pardoned for saying, that an experiment which can be so easily made, and which may possibly produce such important effects, is not undeserving of a trial.

---

* Vol. ii. p. 108.

† Vol. ii. p. 196.

But although it appears to us that the views of Dr Alison are more gloomy than the circumstances warrant, and that, by the means which we have taken the liberty to suggest, many who now sink into irretrievable ruin, might be rendered not only useful to themselves but to the country, we are far from participating in the sanguine expectations of those who think it possible altogether to extinguish the calls upon our charity, and to make every individual maintain himself by the produce of his own hands. In every community there must be some unfit for labour through natural imperfections, some through infirmities brought on by themselves; and in a highly civilized and artificial state of society, even where no such causes of destitution exist, it must occasionally happen that persons who are both able and willing to work are thrown out of employment by new inventions, stagnations of trade, and other contingencies beyond their control. In all such cases, we think with Dr Alison that the sufferers ought to receive relief, let their past conduct have been what it may. We also think that, in large towns, the efforts of voluntary charity are quite unequal to the task, not merely from the want of funds, but from the impossibility of private individuals carrying out an efficient and connected system. It is quite evident that, if money is given to tailors, shoemakers, &c., who have reduced themselves to poverty by mismanagement, there is no reason to expect that the funds contributed to them in charity will be better applied than the wages formerly received from their masters. This is evident from the statement of the Treasurer of the Edinburgh Workhouse. The relief, then, ought to be in kind; but how are the necessary purchases and distributions to be accomplished by private individuals who have business of their own to occupy their attention? The number now receiving relief in Edinburgh amounts to 6 per cent. of the population. The inquiring into the circumstances and supplying the wants of such a multitude would be ample employment for several persons. It never can be well done by men who may or may not execute the duty as suits their own convenience, or perhaps their whim; and in this, as in every other matter, the public must pay for the services which it requires, if it would have these services properly performed.

---

* Vol. ii. p. 108.

We also agree with Dr Alison in thinking, that, in towns, paupers who are unable to work, and have no friends to support them, ought to have accommodation provided for them in hospitals. No one doubts that this is the best way of relieving such as are labouring under temporary indisposition; and it is not easy to see how it should be less adapted to those whose disorders are permanent. However they may be maintained, the means must come from the public; and it is plain that these means may be much more economically managed by the arrangements of a large establishment, than they can be in the comfortless habitations of individual paupers.

Still farther, we are clear, that, in the case of the able-bodied, no test of pauperism can be depended upon but that of their submitting to work of a less inviting kind than the ordinary labour of the place. But, although we have the utmost respect for the English Poor Law Commissioners, we cannot help doubting with Dr Alison, if it can yet be considered as established, that this work must, of necessity, be performed in a workhouse. In undertaking so difficult a task as that of reforming the Poor Laws of England, nothing could be more judicious than the general principle laid down by the Commissioners, "that those modes of administering relief which have been tried wholly or partially, and have produced beneficial effects in some districts, be introduced with modifications, according to local circumstances, and carried into complete execution in all;" * and the selection of Bingham and Southwell as models was made in strict conformity with this principle. But, although the workhouse system established in these parishes appears to have succeeded better than any other that had been tried elsewhere, it does not follow that it is so perfect as to admit of no improvement, or that it is as well adapted to a large town as it is to a country district.

* Report for 1834, p. 261.

The impropriety of compelling widows with orphan daughters to seek refuge in a workhouse, has been pointed out by Dr Alison, and can be justified on no other ground but that of necessity. No doubt, a classification is attempted; but where no punishable offence has been proved, or even alleged, there can be no good grounds for distinguishing one from another. Persons from a reputable district would, of course, be separated from the contaminations of the wynds of Glasgow; but they may be classed with other companions, scarcely less dangerous, though not so well known, and neither matron nor guardians can afford them the slightest protection. If females were employed in knitting, or other piece-work, no superintendence would be required. Work of this kind might be as well performed in their own houses as in a workhouse, and would be quite as good a test of destitution. Were such work put into their hands and not executed, then, indeed, the workhouse would be the only alternative, and it might with great propriety be provided for such cases; but to immure all indiscriminately who have the misfortune to be in want seems an unnecessary severity towards them, and an unnecessary expense to the public.

But farther, is it quite clear, that in a town the confinement of a workhouse is absolutely necessary, even in the case of males? We are informed by Dr Alison, that, in Holland, the workhouses are "held in reserve for those whose character is bad;"* that, in Denmark, the labour of paupers is not all performed in workhouses; † and that, in England also, it has been found perfectly possible to apply the test of labour to the able-bodied, without compelling them to enter a workhouse. ‡ Nor is the practice unknown in this country. The walks on the Calton Hill and Salisbury Crags were executed by able-bodied paupers; and perhaps, without any serious loss to the city, some of its later and more expensive improvements might have been kept for the employment of the destitute. In fact, the great argument used to prevail on the citizens of Edinburgh to agree to the Improvement Assessment was, that the works projected would give support to the numerous tradesmen who were then thrown idle. Works of this kind would appear the very best in which able-bodied paupers could be engaged.—Of real utility when finished, yet not by any means absolutely necessary, nor undertaken solely with a view to a pecuniary return. Such works could never interfere with ordinary labour; and there is hardly any situation in which something of the kind might not be found. The paupers thus employed might be as completely separated from ordinary labourers as they could be in a workhouse; and sheds might be erected in the vicinity at small expense, to afford them employment in bad weather in breaking stones, grinding corn, &c., as in the English workhouses. All the other arrangements of a workhouse might be easily adapted to labour of this kind;

* Reply to Mr Monypenny, p. 15.

† Management of the Poor, p. 149.

‡ Ibid. p. 78.

and, when the day is over, the paupers might be allowed to return to their homes. A day's food of the simplest kind for a whole day's work, could never be an inducement to a man to become a burden on the public if he could get employment any where else; and we can imagine no other objection to such a test of pauperism. It would require very little machinery for its application, and would very considerably diminish the extent and expense of workhouse accommodation. At the same time, it is only a modification of the tried and approved mode of administering relief which has been adopted by the Commissioners, and might, in perfect consistency with their general principles, be made the subject of experiment.

Dr Alison has been chiefly conversant with a city population, and his great object seems to be the relief of the city poor. Indeed, we are inclined to think, that he would have been contented to confine himself to an experiment on this class of paupers had he not entertained an opinion, that, if such a provision as he contemplates were made in towns, they would be overwhelmed with immigrants from the country parishes. But, if the relief given to the able-bodied were not such as to attract the labourers of the place when employment of any other kind could be obtained, surely strangers would scarcely be induced to change their residences by the hopes of sharing in so unenviable a benefit at the distance of three years. As to those, again, who are already paupers, no measure of the kind for the relief of the poor of cities would be adopted, without a corresponding measure for putting a stop to mendicity; and it cannot be supposed that any one would leave a parish on which he has a legal claim for another in which begging is excluded, and where nothing could be obtained till after a residence of three years.

But it is alleged, that even the inadequate provisions of the towns have already brought upon them serious burdens from country districts; and it is inferred from this, that, if the town's provisions were put upon a better footing, the evil would be much increased. Both the assumption and the conclusion appear equally groundless.

It may be readily granted that a considerable number of patients, lately from the country, will always be found in the City Hospitals, some attracted by the superior medical skill which the city affords, many laid aside for a time by complaints arising from the change of life. For the former class of invalids a provision is made in most hospitals, by contributions from the parishes benefited, and, when the cure is effected, they, of course, return to the country, without becoming at all burdensome to the town. The other class, after having overcome the first attack, become as useful workmen as any of the native population. It may also be granted that the inmates of Houses of Refuge are generally strangers, all of them, no doubt, very destitute, and all ready to ascribe their wandering life to want of work and want of charity in their native districts. But we know, from the Report on the Constabulary Force of England, that this class of paupers is intimately connected with the whole crime of the country, and that little regard can be paid to the reasons which they may assign for leaving their homes. At all events, the proposed provision for the poor of towns could have no tendency to augment their numbers. In the House of Refuge they are separated from the population of the place, and only retained for conveyance to their proper districts.

But it is the opinion of Dr Alison, that, independent of these temporary burdens, the large towns of Scotland suffer a heavy permanent addition of pauperism, in consequence of much greater immigrations from the country "than the existing demand for labour requires." * "This," he says, "it is easy to prove." To us the fact appears to be conclusively contradicted by the wages given in towns so much exceeding those of country labourers. How is this to be accounted for if the supply of labour, from whatever quarter, exceeds the demand? A table is given, shewing the number of "out-pensioners of the Charity Workhouse of Edinburgh, classed according to the population of the counties." This table is referred to for the purpose of shewing "how small a proportion of the burden, now permanently resting on that institution, has been imposed on us by our native population." But the general proposition which it is intended to illustrate is, "that the larger towns are burdened with the country poor" to an unjustifiable extent. We presume that the numbers of stranger paupers thrown upon Edinburgh are to be considered as coming indiscriminately from all parts of the population set down in the table, and all of this being called *county* population would naturally enough be supposed *country* population by a careless reader. Indeed, if not so understood, the table will be of no service to the argument. Thus understood, the extent of the burden, which appears from the table to have been thrown upon Edinburgh by the country, is very great. Of 759 paupers deriving relief from the Charity Workhouse, only 259 appear to be natives of the city of Edinburgh. The remaining 500, we are left to suppose, are all from the country. But the population of the table is the whole population of Scotland, both town and country, and we have already seen that, according to Dr Alison's estimate, one-half of this population is contained in the towns. Surely they must have contributed some portion of the stranger paupers now burdening the Edinburgh Workhouse. Some must have come from the parish of St Cuthbert's, for instance, which is, in fact, a part of what passes generally under the name of Edinburgh; some from the Canongate, usually reckoned another portion of the same city; some from Leith; some from Glasgow, &c. This table, then, cannot be held as at all shewing the extent of the burden which the *country* alone has imposed upon Edinburgh.

But farther, Dr Alison states that "the records of the Charity Workhouse do not, unfortunately, enable us to judge how many of the families from the country, now charged on the City of Edinburgh, had given it the full benefit of their labour, and how many had resided here only a few years before they became paupers, or had been nearly incapable of profitable labour before they came here; but," he says, "it may be judged, from what has been already said, that a large proportion must have belonged to the latter class." We presume Dr Alison draws this inference from the number of paupers, recently from the country, who resort to the Town's Hospital and House of Refuge; but the great number of country paupers in these institutions, who have given little of their service to the town, we have already seen, arises from special causes, and will not authorize any general inference. Nothing, however, is more certain than that, if the mass of the country paupers, now settled in Edinburgh, have been driven to that city by the inadequacy of the provision at home, they must have come in greatest numbers from the counties where the provision is most scanty. But it does not by any means appear, from Dr Wallace's table, that these counties are most burdensome to Edinburgh. No county is more conveniently situated for such immigrations than Fife, and the annual expenditure on the poor of that county only amounts to 1s. 2d. per head of the population; but the proportion of its population in the list of Edinburgh paupers is only 1 in 4156. The expenditure on the poor of Linlithgow is a little greater than that of Fife, being 1s. 4d. per head of the population; but the proportion of paupers from Linlithgow, now drawing relief from Edinburgh, is more than double that from Fife, being 1 in 1941 of the population. The expenditure on the poor of Haddington is 2s. 6d. per head of the whole population, which is more than double the provision from Fife; but the paupers from Haddington, settled in Edinburgh, amount to no less than 1 in every 1128 of the population, nearly four times the proportion from Fife. Even the comparatively distant county of Berwick, whose provisions for the poor are almost on a scale of English liberality, sends a pauper to Edinburgh for every 3095, being a fourth more than the proportion of the population of Fife now burdening the Edinburgh funds. This is surely sufficient to shew that emigration to Edinburgh in no degree depends upon the provision made there for paupers, or the want of such provision in the districts from which the emigrants have come.

---

* Reply to Mr Monypenny, p. 25.

The charges made by Perth upon the surrounding country are of a much more serious nature. That town is not only declared to be inundated by paupers from the neighbouring parishes, but it is said that "those in the secret of such matters in the country parishes pay the rent of a house for those they wish to billet on their neighbours, till a legal domicile is obtained, and then throw off the mask." No particular instance of a fraud of this kind is mentioned by Dr Alison; he does not give the name of his informant; that person does not pretend to speak from his own knowledge, nor does he state upon what authority he makes this grave accusation. The individuals indicated as "those in the secret" can be no others than the landed proprietors, the clergy, and the respectable tenantry of Perthshire, for these are the guardians of its poor; and surely their character ought to be a sufficient protection against an attack so indefinite and so utterly unsupported. Indeed had the city of Perth been borne down by such an inundation, it could not have been a secret known only to a few; and if that community had not sought protection from courts of law, they would certainly have branded the practice by the resolutions of public meetings with the opprobrium which it deserved.

The statement from Aberdeen is equally vague. It is impossible to discover from it what proportion of the country poor now charged upon its funds have been profitable labourers to that city, and what proportion have not.

But farther, to entitle the towns to complain of the burden of country paupers, it is not enough for them to shew that these paupers have not themselves given an equivalent for the charge. The burden of the whole poor is borne by the whole inhabitants, including stranger settlers as well as natives; and to authorize such a complaint, the towns must shew that the burden of the country poor has neither been balanced by the profit arising from their own labour nor that of the other immigrants from the country.

In every statistical report, the growing population of the towns is set forth as a proof of their growing prosperity. In the thirty years (from 1801 to 1831) Glasgow nearly tripled its numbers; those of Aberdeen were more than doubled; and those of Paisley and Dundee increased very nearly in the same ratio. All admit the increase to be a certain indication of their increasing wealth; and the magnificent public buildings and private works which have arisen in these places, confirm the justice of the inference. But it will not be said that their numbers have grown merely from the produce of the native population. According to all authorities, the mortality of towns is much greater than the mortality of the country. In Glasgow, which has made a greater advance than any of the other towns, Dr Alison states that, in some years the deaths have amounted to 1 in 24, and even to 1 in 21, while in England and Wales they have only amounted to 1 in 45.* It is also ascertained that the births in towns are fewer than in the country. Yet in place of the country population having advanced more rapidly than that of the towns, Mr Alison states that, taking Great Britain at large, while the inhabitants of the towns have during these thirty years "all doubled, and many of them tripled in numbers, the cultivators of the fields have been slumbering on with an increase of only 26 per cent."† It is, then, through accessions from the country, that the town's population has risen to its present amount. But would their wealth have kept pace with their population, if they had drawn nothing from the country but paupers and invalids? It is plain that the bulk of those who have emigrated from the country to the towns, are only a section of that class which supplies the emigrants to the colonies,—young men of enterprise who, having profited by the instruction of our parish-schools, go forth upon the world with the hope of gaining something beyond what is to be had at home, if not, like many of their countrymen, of rising to distinction. Many of them, from the humble rank of operative tradesmen, become leading commercial men, and attract to the places which have the good fortune to be made the scenes of their operations, the wealth of the most distant countries. All of them are precisely at that period of life when their services are most useful to the community. With the strength, they have also the pliability of youth, and are in a state to be moulded to any habits which circumstances may require. Of the native population, it is well if one out of every family, that is, one of every four or five, be completely fit for labour. But of settlers from the country, every man, or almost every man, is in a condition to undertake work of any kind. It is necessary, then, to inquire to what extent the means out of which the towns' poor-rates are paid have been furnished by the labour of such persons; to what extent they have been furnished by the talent and enterprise of country settlers who have risen to the rank of masters and directors of the energies of the native population; and to what extent the rates are drawn from those country settlers who have realized their fortunes, and have retired from the bustle of active life. After these deductions, what remains may be considered the contribution of the native population, and we doubt if in any of our mercantile towns it will exceed the amount expended on the native poor. At all events, these towns have no right to complain of the incursions of country paupers till such a calculation has been made.

---

* Management of the Poor, Preface, p. 5.

† Vol. i. p. 46.

The situation of Edinburgh is not very different. It very nearly doubled its population between 1801 and 1831, of course also from country immigrants. A large portion of these have necessarily belonged to the humbler classes, and, as in manufacturing towns, they have made themselves useful as operative tradesmen. But a considerable portion also have belonged to a higher rank, some attracted by the society of the place, some by the University and Schools, and still more to fill the different departments of the law. All of these classes draw their subsistence from the country, and there can be very little doubt that they much more than indemnify the town for the expense of supporting the country paupers. We are perfectly aware that the members of the College of Justice are not directly subject to the rate, but from them, to a great extent, the rate-payers draw the means which enable them to bear the burden. This accordingly was the original ground of their exemption.

On the whole, we see no ground for thinking that the loss which the towns have sustained by country paupers, is greater than the gain which they have derived from country settlers. But whether this be the case or not, we are happy to see that, in Dr Alison's communication to the British Association, he gives it as his own opinion, that few come from the country with the express view of becoming burdens on the charity of the towns. He says, "It has sometimes been stated that poor families from country parishes resort in great numbers to the large towns, merely in order to become paupers; but this is not a common case. They come to the great towns much more generally in search of work." It is only on failure of employment that they "swell the lists of suitors for public and private charities in the towns."* This is precisely the opinion which we had ourselves formed. Being either inferior or unsteady workmen, they have not been able to find masters; or, after obtaining employment, they have become disabled for working. Much of what we have said on this subject must be considered rather as an answer to the authorities quoted by Dr Alison, in his reply to Mr Monypenny, than an attempt to controvert his own views. It is a point of so much importance that we were unwilling to pass over any thing that had been said upon it without the most careful consideration.

But if the provision of the towns, as it now stands, has rarely the effect of bringing paupers from the country, surely such incursions would be still less frequent under the much more perfect system of the new Poor Law of England. A fuller and more certain provision would no doubt be afforded by that law to the proper poor of the towns; but it would also afford a much greater protection against imposture of all kinds. If we are correct in this view, the measure might with perfect safety be adopted in towns, without waiting for a general unanimity of sentiment on the subject throughout the country.

But the question still remains, whether the country parishes ought not, for their own sakes, to adopt some modification of the English system?

In many of those districts where poor's rates are already established, we can entertain very little doubt that it would be productive of benefit. The complaint of the continued increase of poor's rates wherever they have been established, is quite universal, and as the state of these parishes seems much to resemble the general condition of England before the enactment of the new poor-law, there appears no inconsiderable danger of the burden upon them becoming equally oppressive. No single parish can afford to maintain officers sufficient to check its progress, and it is only by unions of parishes, such as have been formed in England, that efficient establishments can be kept up. The English parishes suffered just in proportion to the smallness of their population. It was found that on examining the rates of the whole parishes of the kingdom, "the 100 absolutely largest parishes, containing a population of 3,196,064, give 6s. 7d. per head; the 100 intermediate parishes, containing a population of 19,841, give 15s. per head; the 100 least parishes from which poor-rate returns are made, with a population of 1708, give L.1 : 11 : 11¼ per head." † The new poor-law, by introducing a proper system of checks, has not only stopped the progress of this evil, but very much reduced the general expense of pauperism, and we can have very little doubt that, sooner or later, some districts of Scotland will be compelled to resort to a similar expedient. It is, however, a matter for their own consideration, in which we do not think other districts, either in town or country, have a right to interfere—and if we are right in our opinion that the system, under proper management, ought to afford sufficient protection against stranger poor, the question whether it ought to be adopted in any place, ought, in no respect, to be made dependent on its adoption or rejection in other districts.

---

* Page 3.

† Report of 1834, p. 317.

With regard, again, to those districts which have not yet subjected themselves to poor's rates, we can, by no means, speak with equal confidence; certainly, in such situations as the Hebrides, we should think the expediency, perhaps even the practicability, of such a change extremely doubtful.

Dr Alison complains, and no doubt with reason, of the extreme inadequacy of the present provision made for the poor of that district, mentioning, as an instance, that L.3 is the entire amount annually collected in one of these parishes for the whole of its poor, but he does not explain the circumstances of the parish. We do not know whether that is the only means to which the poor have to look, to what extent the funds for their support admit of being increased, and how far it may be possible to improve the condition of the poor of these districts by their own exertions. In our last Report, we extracted some account of the Lewis from the statistical reports of the clergymen. We observe that the annual collections of the parish of Barvas do not exceed L.3, and the effect of the proposed system of poor-laws in the Lewis would probably be much the same as upon the parish to which Dr Alison refers. Suppose, then, that the new poor-law of England is to be introduced into the Lewis, it is very clear that whatever may be said of the possibility of applying the test of work to females in their own houses, in other parts of the country, the filth and darkness of the Lewis habitations would there oppose insurmountable obstacles. As the males, again, can hardly be employed in work which does not require superintendence, they also must be collected together. All the essentials of a workhouse are thus quite unavoidable. What, then, are to be their inducements for availing themselves of the workhouse when it has been provided for them? It will hardly be the meagre fare which it affords, for we are informed by the Statistical Report that "the peasantry do not much experience the want of food. In winter, the most of them may have beef and fish if they choose."* "None need be in absolute want if they have health, except through laziness. Sometimes in summer, after a severe winter, having given their potatoes to the cattle, they fall short of provisions, but while the sea is open and plenty of shell-fish on the shore, they cannot be in absolute want."† This is the account given by an intelligent man residing on the spot, and totally free from theoretical bias of any kind. In such circumstances, a share of the L.3 collected must be a matter of little consequence to any one; but the hospitality of friends is a much more important resource. Every house is open to them to the effect of placing the poorest almost on a par with the labourer. This may not be the most economical way of providing for a pauper, but it proceeds from a spirit of benevolence which no law either can or ought to repress. It is very true that relief thus given, does not come directly from the pocket of the landlord, but it is as much taken into account in fixing the rent as the provision for the tenant's own family. The mere want of food, then, is not likely to drive the Lewis pauper to the workhouse, and most unquestionably its other luxuries would never induce a man to submit to its labour and restraint who is so averse to employment of any kind that he actually allows the manure of his cattle to collect under the same roof with himself for a whole twelvemonth before he thinks of bestirring himself to carry it to the field., We know that the aborigines of the district of Cumberland, in New South Wales, laughed at the houses built for them at the expense of this country, and offered free of any service or other exaction.* And although we do not say that the inhabitants of the Lewis are altogether so barbarous, we cannot think that they are sufficiently civilized to appreciate the value of a workhouse. There seems even to be some doubt if the aged and disabled would take advantage of it; as, in a country to which its natives cling with such tenacity, none can be without friends who are willing to share with them such accommodation as they possess. As to families deserted by their fathers we believe nothing of the kind was ever heard of among them, and their habits are so inoffensive that the workhouse could hardly be required as a means of restraint. It thus seems more than probable that the whole machinery would be totally inoperative.

---

* Ross and Cromarty, p. 129.

† Ibid.

But there is another consideration which must not be altogether lost sight of. We allude to the expense of the proposed establishment. The population of Barvas in 1836 was 1840, and the rate upon this parish at 8s. per head, the amount which Dr Alison calculates on ultimately raising, would be L.735. But the whole rental of the parish amounts to no more than L.1070, and deducting minister's stipend and other burdens, it can hardly be said to exceed L.800. The tenantry could never be expected to pay their proportion of so heavy a burden over and above their present rents, and at all events the whole must fall upon the landlord at the expiry of the existing leases; would it then be proper that so large a portion of this small rental should be thus appropriated? We admit "that the poor have a decided claim in justice to a support from off the land on which providence has placed them, if that land is capable of affording it to their exertions."† But if they altogether withhold these exertions, and the land, in consequence, fails to make the return of which it is capable,—if, in short, their want proceeds merely from laziness it would surely be hard that the landlord alone were made the sufferer; and to impose upon him an assessment, not only so disproportionate to his means of payment, but to the capacity of the people for enjoyment, would really be little better than to tax the aborigines of Australia, who have nothing, for the expense of the houses which they despised.

---

* Two Years in New South Wales, by P. Cunningham, London, 1827, p. 19.

† Reply to Mr Moneypenny, p. 41.

It is impossible to arrive at correct views upon this question without attending to the changes of aspect which it assumes in different stages of society. If we look back once more to the savage state, we shall, in all quarters of the globe, find an extent of privation which is never experienced in more civilized times; but no one would think of attempting to relieve this by a poor's rate, for there is then no accumulation of property in the hands of individuals to be the subject of taxation. In this state, however, there is little distinction of ranks, and all are admitted indiscriminately to the same board. The hospitality of a barbarous people is denied to none. Through many succeeding stages voluntary charity is still the natural resource of the indigent. Even after the community has divided itself into a regular gradation of ranks, there is still so much connection among the different classes that the situation of every individual is perfectly known and the pauper is not much worse provided for than the labourer. Nay, after the connection between the higher and lower orders has almost entirely ceased, this state of things may still remain, the pauper drawing his supplies from the farmer, who, as in the case of the Lewis, accommodates his rent to the burden. But as a taste for artificial wants advances, larger contributions are required for placing the pauper in a situation at all approaching that of the labourer. His demands consequently increase beyond the calculations of the farmer, who then calls for a poor's rate as the only means of obtaining assistance from extensive proprietors. Whether resident or non-resident, they are nearly equally removed from the sphere of the pauper, and inaccessible by other means.

This has been the history of poor's rates in every parish of Scotland which has adopted them. It is the improving condition of the labourer that exposes the wants of the pauper both to his own eyes and those of the community; and the complaints of the increasing demands of paupers which pervade the whole of the statistical reports, afford the best possible evidence of the increasing comforts of the labouring classes. In the present state of the country any attempt to improve the condition of the pauper by a poor's rate, before such a measure has been called for by the improved condition of the labourer, would appear of very doubtful expediency. An experiment of this kind is now in progress in Ireland, and we shall presently see its effects. In the mean time, we observe from the excellent Reports of Mr Nicholls preparatory to the introduction of the Irish law, that this high authority considers it absolutely necessary to elevate the habits and general character of the class immediately above the pauper as a preliminary to any effectual improvement in the pauper's own circumstances. It is chiefly as a means of bringing about this change that he depends on the Irish poor law.

Comparing the situation of the Belgian peasant farmer with that of the small Irish occupier, he says, as respects their position in society, they do not materially differ, but the Belgian "is in a far better condition as regards the comforts and conveniences of life. *The cause of this difference is, I believe to be found in the more skilful system of culture pursued by the six-acre farmers of Belgium, in the rigid economy which characterises them as a class, and in the persevering industry, providence, and forethought which enable them to adjust their limited resources to their wants; and the first step to the improvement of this important class in Ireland must be, I think, to endeavour to assimilate their farming operations, and agricultural and domestic management, to that of the same class in Belgium.* It is not here necessary to enter into a consideration of the comparative merits of small and large farms, it being notorious that farms of very small extent abound in all parts of Ireland, in some districts indeed almost to the exclusion of any other; and that any attempt at a rapid *consolidation of these small holdings would inevitably produce misery and suffering for which no adequate remedy has ever yet been devised.* Extensive changes of this nature cannot be successfully undertaken without special reference to the moral and social condition of people; and the obstructions which arise from fixed habits, and old social arrangements generally, render great organic changes impossible excepting in the lapse of years. But an improved management of the small farms of Ireland would afford the means of increasing the domestic comfort and elevating the social condition of the cottier tenantry, and would facilitate the progress of whatever other changes may be regarded as likely to promote their general wellbeing, *because it will be accompanied by an improvement in the habits of the whole class.* This would, in fact, be beginning at the lowest point of the scale. Improved management in the small farms would bring increase of capital and improved habits among the cottier tenants. With the increase of capital will come the desire to extend their holdings, and thus will arise a tendency to consolidate occupancies for the employment of increased capital, which the vast extent of now waste but reclaimable land in Ireland will greatly facilitate. An increase of agricultural capital will speedily act upon all the other sources of industry, and thus the demands of the home market for agricultural produce will be augmented, while for all that is produced above that demand the markets of England will be open. *To begin with the improvement of the small cultivators seems, therefore, to be necessarily the first step towards ameliorating the condition of the Irish people;* and the example of Belgium is important, as shewing what may be done in this respect by adopting an improved system of cultivation."[*]

[*] Page 168.

There is scarcely a word of this valuable extract which will not apply to the Highlands of Scotland. Improve the cultivation of the small farmer of the Lewis, and all the pressing wants of the population will at once disappear. Mr Nicholls thinks that the poor-law will conduce to this change, by "combining the now discordant elements of society in Ireland for the promotion of the common interest, and especially that of the humblest classes."* Happily in the Highlands the utmost harmony prevails, and no measure of this or any other kind is required to allay discord. Mr Nicholls adds,—"But the first impulse in the career of amelioration must be given by the gentry and landed proprietors, who must unite in promoting improvements among their tenantry, as well as in carrying out the provisions of the law."† If by this is meant that the landed proprietors must direct and stimulate the industry of their tenantry, we perfectly concur in the views here expressed. It is precisely what we endeavoured to press on the Highland proprietors in our last Report, and what the Highland and Agricultural Society are now doing by their spade competitions. We can hardly imagine the compulsion of a poor's rate necessary to induce proprietors to do this. Certainly nothing of the kind is required by Highland proprietors. But we rather think that Mr Nicholls, in the passage last quoted, intends to express his concurrence in the sentiments contained in a Report by Mr Stanley, which is given by him in an appendix, and is referred to by him elsewhere with approbation. Mr Stanley's expectation from the Irish poor-law is, that it will give "the landholders and tenants an option of using beneficially the sources of society's subsistence placed in their control, or of paying a tax for the support of such of the labourers' families in their respective localities as should become destitute by want of employment."‡ That, in fact, the rate-payers will create work of their own for the labourers to avoid a heavy assessment.

We have heard precisely the same reasoning used in favour of the poor-law being extended to the Highlands, but in that country we fear expectations of this kind are altogether groundless. It is not among the proprietors and higher rank of tenantry, but among the labouring classes themselves, that there is a want of energy. Such is their apathy in many districts, that work is rejected by them when offered on the most advantageous terms. They saw with perfect indifference the large sums expended on the government works go into the hands of strangers, although one great object of these works was to give them employment. The proprietor of one of the islands has lately drained a great part of his estate, but he was obliged to import labourers for the purpose. Another gentleman, whose estate is on the mainland, a short time ago offered the inhabitants of a village L.50 to make a road which was to be of very little use to him, but a great accommodation to themselves. His principal object, indeed, was to overcome their sluggish indolence, but his offer failed of the effect. They preferred to remain in absolute idleness to availing themselves of his liberality.

---

* Page 169. † Ibid. ‡ Page 138.

It is plain, that in the Highlands the work of improvement must begin a step farther back than the point at which the Poor-Law Commissioners propose to start in Ireland. The energies of the peasantry must be called forth, and their labour must be made worth a price before any person can be expected to pay for it. The experiment on the men of Islay clearly shews that this may be done. We admit that Islay is in many respects much more advanced than the rest of the Hebrides, yet its inhabitants are certainly not free from that dislike to work which characterizes the Highlanders generally. We admit also, that the experiment was made under every advantage, the presence of their much respected chief giving a vigour to their exertions which nothing else could have inspired. But as we believe the Highlanders to be more devoted to their landlords than any other portion of the British peasantry, so we believe that their landlords are equally attached to them, and would strenuously forward any measure calculated to promote their benefit. Nothing but the countenance of the higher orders seems necessary to insure the success of the plan which the Highland and Agricultural Society are now prosecuting. However inert at home, the Highlander has never been backward in the field; and although the prospect of a harvest at the distance of months be insufficient to overcome his natural sloth, were the ordinary operations of agriculture thus invested with the interest of an onslaught in which, by the exertions of a few hours, he could win a character among his neighbours and the good opinion of his landlord; we are entitled to say, from what has been already seen, that everywhere he would contend as eagerly for the bloodless laurels of peace as ever did his bold ancestors for the deadly trophies of war. The whole work on his allotment throughout the year would become a training for these exhibitions, as the cultivation of more extensive possessions has long been for the ploughing-matches. The spade would by these means soon be thoroughly mastered; that acquisition would lead to others; landlords would have no difficulty in prevailing on tenants of capital and intelligence to settle on their estates, and direct the industry of such a peasantry; and the country would advance steadily in the career of improvement so well described by Mr Nicholls. These measures certainly appear much more likely to raise the character and condition of the Highlanders than any possible modification of the English poor-law.

Dr Alison does not think that the rate-payers of Scotland can be safely intrusted with the administration of the funds of the poor, and he would remove all questions connected with these funds to the Sheriff or some other magistrate, over whom they have no control. We can see no ground for this change. The power of appropriating the funds must be held as nearly the same with that of imposing the tax, for if a magistrate is authorized to fix the allowance of a pauper, nothing is left but to apportion that allowance among the community. Now, it is the leading principle of the British constitution, that the tax-payer shall have the privilege of assessing himself by his own voice—or that of his representative. It is fully recognised in the poor-law of England; it is also fully recognised in the poor-law of Ireland; why, then, should Scotland be deprived of this privilege, and handed over to the despotic disposal of Sheriffs or any other irresponsible officers appointed by royal prerogative? As we now stand, the rate is in general paid in equal proportions by the landlord and tenant. In towns it is imposed and managed by the magistrates, who are chosen by the rate-payers; and in country parishes it is imposed and managed by the landed proprietors and kirk-session. The landlord has a permanent interest in the matter, and every landlord has a vote. The interest of the tenant is temporary, and he may be considered as fairly represented by the elders, who are almost always taken from among the most respectable of the tenantry. The minister, although not a rate-payer, from his intimate acquaintance with the circumstances of the parish, and his desire for the welfare of all who are connected with it, has most properly a seat at the board. We can scarcely imagine a better choice of guardians. They are, in fact, taken very nearly from the same classes as in England under the new poor-law. If any one of their number shall deem a rate necessary, it is not in the power of the others to disappoint the object by keeping aloof. A meeting being once legally called, those who may attend are entitled to proceed without regard to the absent members.* At such meetings it may frequently happen that the landed proprietors are but imperfectly represented, but the kirk-session are always upon the spot, and will generally be inclined to follow the recommendation of the minister, who never can be unfavourably disposed to the poor. Till lately, the whole of our Scotch authorities were adverse not merely to assessments, but to liberal voluntary provisions, not only as improper burdens upon property, but as tending to degrade the character of the lower orders. That these principles have had much influence on our guardians, cannot be doubted. Yet they have not prevented assessments from being introduced into nearly a third of the parishes of Scotland, nor have they prevented a rapid rise in the provisions for paupers, both legal and voluntary, in all parts of the country, with no other compulsitor but the charitable feelings of the guardians, and the influence of public opinion. The manner in which Dr Alison's works have been received is sufficient to shew that there is no want of charity in Scotland. We have heard of more than one parish in which they have already had the effect of increasing the rates to the extent of 50 per cent. No doubt the rates in Scotland, if imposed by the present authorities, will not at once rise to an equality with those of England. The circumstances of the two countries are in all respects different. Our capital is much smaller, and throughout the whole agricultural population there is, generally speaking, a much greater spirit of enterprise; labour of all kinds is much better directed, and agricultural labourers are thus on the whole better employed. But we may rest perfectly satisfied that our assessments, if thus imposed, will keep pace with the circumstances of the people, and will be much better regulated than they ever could be by the authorities on whom Dr Alison would devolve the management. What, for instance, could a Sheriff residing in Tain or Edinburgh know of the situation of a pauper residing in the Lewis? Even Dr Alison, who is certainly much better acquainted with the state of the poor than any lawyer in Scotland, would, in our opinion, be nothing like so competent a judge as a farmer residing upon the spot, who has an opportunity of seeing both the wants of the pauper and the ability of the district to afford relief. If it shall appear to such a person that it would be better to give a little oatmeal from his own store than double the quantity at the joint expense of himself and his landlord, we may rest assured that any Sheriff who would compel him to do otherwise would, in nine cases out of ten, commit flagrant injustice.

---

* Mr Dunlop, c. v. § 2, p. 123.

This is not an imaginary danger. None of our Sheriffs have studied this subject with greater care than Mr Alison; and there is none in whose judgment both his brethren and the country would repose greater confidence. Now Mr Alison gives it as his decided opinion, that the allowances to paupers in towns should be " L.6 a-year even for an infant child, and L.10 or L.12 for a grown person."* The lowest wages of country labour can hardly be stated at less than a half of the lowest wages of towns; and if a Sheriff is to look at nothing but the wants of the country pauper, he could hardly pronounce a claim of the half of the town's allowances to be excessive. If we apply this rule to the Lewis, and assume the proportion of its population requiring relief to be the same as that of Kilmuir, the parish to which Dr Alison refers, the number of paupers in the parish of Barvas would be 160, and the lowest allowance for them would amount to L.800, just about the entire free rental. But in this division of the means of the parish, are the proprietor and his family to be altogether forgot? Surely the Sheriff would feel himself bound to leave them some share of the produce of their own property, and Mr Alison is much mistaken in supposing that the contending interests of these parties could be adjusted to his own satisfaction, not to say theirs, at the expense of a few shillings, or in the course of a few days. If the pauper is to receive nothing till these discussions are ended, having renounced *charity*, he may starve before he attains to *justice;* or if the Sheriff is to award an allowance before he has made himself acquainted with the merits of the case, he may beggar the proprietor to provide for one who is no way deserving. Besides all this, what could be more monstrous than that the legal owner of property should be compelled in self-defence to make such a disclosure of his affairs as is here supposed, at the instance of parties whose only claim is upon his charity, and whose "laziness" is frequently the only cause of their poverty?

---

* Vol. ii. p. 233.

We have been carried into a much wider field than we had anticipated. The conclusions of our last paper being so much at variance with those at which Dr Alison has arrived, we have thought it necessary to continue our inquiry; and, from investigating the means of lessening the number of paupers, we have been led to follow Dr Alison into an examination of the means of their relief. It is a subject of deep interest to every district of Scotland—to every member of the community, and nothing connected with it can be indifferent to a Society formed for the express purpose of "Improving the Condition of the Working Classes." It will, however, be distinctly understood, that the writer of this paper is alone responsible for the opinions which it contains. The members of the Society are so much scattered that it would be impossible for him to collect their views; and though it were otherwise, he would deem it improper to ask them to commit themselves upon points which, although urgently demanding their consideration, do not require to be decided by the Society for the due administration of its affairs.

We have only to add, that whatever variety of sentiment may prevail as to other matters, all are equally sensible of the obligations which Dr Alison has conferred on the community by fixing the attention of the public upon this subject. None can be more so than ourselves. While the association to which we formerly alluded are endeavouring to obtain a government investigation into the state of pauperism in this country, we are glad to learn that inquiries, suggested by a meeting of influential landed proprietors, held in Edinburgh in March 1840, are now going on, with a view to expiscate fully the condition of the poor in every county, and to probe the effect of the existing system of Scotch poor-laws. Those who attended the meeting now alluded to, considered that such inquiries not only could be made without a government commission, but may be much better made by the natural guardians of the poor in Scotland who know their habits and their circumstances; and, from the energetic way in which the inquiries suggested at that meeting have been set on foot in a number of the counties, there seems to be every disposition to verify the opinions expressed, that there are means existing in Scotland itself, of furnishing all the information on this important subject which can be desired. Though there is thus a difference of opinion entertained as to the best mode of inquiry, the object of all parties is the same, viz. to discover the best means for relieving the wants of their destitute countrymen; and following the golden rule for such discussions prescribed by the enlightened chairman of a late distinguished meeting—"not striving for victory, but to discover truth," both will gladly concur in any suggestion which may promise to attain the end, though proceeding from a nominal opponent, nor will they reject the aid of the humblest coadjutor.

EDINBURGH, 22 NORTHUMBERLAND STREET,
28th November 1840.

POSTSCRIPT.

A proof of the preceding paper, and a copy of our former report, have been submitted to a gentleman residing in the Lewis, who is intimately acquainted with the locality, and he has very obligingly favoured us with his observations.

"The greatest obstacle," he says, "to the civilization and improvement of the people of Lewis is their ignorance of the English language. Gaelic is universally spoken in the country, and by the lower orders of Stornaway. The island is well supplied with schools. Many of them are under the Gaelic Society, *and by regulations are not suffered to have an English book within their walls.* The only books a knowledge of Gaelic gives access to, are the Bible, and a very few books on religious subjects; all useful knowledge on the affairs of this world that could be learned from the English tongue, spoken or read, they are thus kept in total ignorance of. This ignorance retards their improvement at home, and prevents them from going south in search of work. They have naturally much reluctance to go, and the inconveniences to which their ignorance puts the few that do go, doubtless operates strongly in keeping the others at home. Notwithstanding a few of the younger have of late years gone out to labour, and considerable numbers now resort to the herring-fishing at Wick; for the last two years to the amount of from 500 to 600 each year." It is the opinion of this gentleman, that the introduction of the English language must be the first step to any essential improvement. "The inert sluggish disposition of the natives would disappear as the use of the Gaelic was discontinued; *the south would be opened to them; the island relieved of a great part of its now idle population; other places supplied with good labourers, who, returning to Lewis in winter, would yearly import an additional stock of information, and with that gradually habits of industry, cleanliness, and comfort;* so that, in a *few years*, instead of this being termed a district the lowest in point of civilization, *it might excel many places in the Highlands and Islands.*"

The statistical reports of the Lewis were written in the year 1836, and what is said in them of the decline of the fishings refers to what had occurred prior to that date. Since then it appears that the fishings have again improved.

Our correspondent states that "beef" cannot be afforded by the lower orders.' The bursting of the shell-fish banks noticed in our former paper, he says, only occurs at one place, and he never "heard of shell-fish being used for manure; when they are found in such quantities, the people preserve them by salting, and then hanging them on strings to dry in their houses." He says, "there is no lime in Lewis," and "Irish lime costs 2s. to 2s. 6d. a barrel in Stornaway." The manufacture of kelp, he says, is still continued to a considerable extent, and he does not consider it to be attended with the injurious effects ascribed to it in the statistical report. The present management of manure, and the system of culture adopted by the small farmers, appear to him not unsuited to the district; but we must say the reasons assigned by him for this opinion do not appear to us satisfactory. He, however, agrees with the statistical reporters, that cultivation might be profitably extended. Upon that point, indeed, the information which we have obtained from other quarters is such as not to leave the slightest doubt. This gentleman also states, that in his opinion "competitions in spade husbandry to begin with would have a good effect."

Thus, although mistakes may have occurred in our statements for which we are ourselves to blame, and although, in some respects, the views of the gentleman who has favoured us with these remarks differ from those of the clergymen of the Lewis, we must regard his communication as a decided confirmation of our main proposition—viz. that the resources of the country, if properly applied, are quite sufficient to maintain the population. Were the education and training bestowed on the population of the Lewis which their circumstances require, they would be at no loss to obtain employment either in reclaiming the wastes of their own island, or in the great works which are in progress in other districts.

Regarding emigration this gentleman says, with equal judgment and good feeling—"Though it would, no doubt, give immediate relief at a great expense, unless whole districts be completely cleared at once, and some security be afforded that these districts cleared shall not be again occupied by small tenants, the present evil will occur again at no distant period from the operation of the same causes. But *there are few, I hope, that would not use every effort for improving the Highlanders at home, rather than have recourse to the harsh expedient (cruel to them) of compelling them to emigrate.*"

The spade competitions of the Highland and Agricultural Society have been extended to some of the Lowland districts; and we learn, from the Report of a very keen contest of this kind which took place last year in Ayrshire, that "a *considerable number* of those who wrought were men *whose daily employment was hand-loom weaving.*" This is another class for whose misfortunes emigration has been prescribed as a cure; but from their engaging so readily in this competition, it would seem not impossible to prevail on them to employ themselves regularly in labour of this kind at home, and thus render it unnecessary for them to incur the risks attending an entire change of country.

DEFENCE OF THE CORN LAWS.*

At the present crisis, when so many absurdities are talked and written regarding the Corn Laws; when the bread-tax is bawled out as a catchword to the Chartists; and when Còrn-Law repealers are an organized body brought forth to overawe the timid at political elections, we cannot help thinking, that the sound and philosophical examination of the subject made by Mr Alison is particularly well-timed. Assuredly no topic, so much spoken about, is so imperfectly understood. What created corn laws? not choice, but necessity; and what continues corn laws? The same necessity. This is the permanent cause which, in all old established states, renders agricultural protection indispensable, if they would preserve their national independence. Let us consider the arguments advanced against this by the anti-corn law advocates.

"It is to no purpose," said Dr Johnson, "to tell me that eggs are only a penny the dozen in the Highlands. That is not because eggs are many, but because pence are few." Mr Alison admirably remarks, that this caustic and profound observation of the Doctor points to the reason which, in every age, has rendered it indispensable for every nation which aims at independence to give legislative protection to agriculture in the advanced stages of civilization. Why? Because prices inevitably rise in the old and wealthy communities, from the great accumulation of the precious metals; and, consequently, the necessaries of life can only be raised at a higher-money cost by the inhabitants than by the cultivators of ruder and poorer states. One of two things must then be done,—either protection of its native agriculture by fiscal duties to rescue it from foreign competition; or its rural population must be allowed to melt away, and the land to return to a state of pasturage; while the nation is made to depend mainly on supplies of corn from foreign states.

Let us now hear, after having stated the case, how the abolition of corn laws folk argue on the point. In Poland, they say, wheat can be raised at from a guinea to twenty-five shillings per quarter; and may be laid down at any harbour in Great Britain, for, at the most, thirty. If, then, the ports were permanently opened, we should have provisions at little more than one-half the price we at present pay for them. Every poor man would thus find his income doubled; and the large surplus, which would be left at the disposal of all classes, after providing for their necessary wants, would immensely increase their general comfort, and enable them to enjoy a much greater quantity of luxuries and conveniences. The home market for our manufacturers would thus increase with the prosperity of the labouring class; and a foreign vent created for our manufacturers, by the vast impulse given to foreign agriculture by our increased demand. The agriculturists, who would be at first thrown out of employment, would speedily find a more profitable employment in our manufacturing establishments, to which this auspicious change would communicate unusual bustle and extension. All deserving classes would be thus ultimately benefited; and none would be permanent sufferers but the selfish aristocrats, who have hitherto escaped insolvency by the imposition and levying of an unjust tax.

---

* Being the third and concluding notice of the "Treatise on Population." By Archibald Alison, Esq.

Audi alteram partem. The agriculturists thus more fairly argufy the matter. Experience, they say, and justly, has abundantly proved, that the British cultivator, oppressed as he is by a load of taxation and poor rates, cannot maintain a competition with either poorer or more fertile states, not subjected to these burdens. Foreign grain, if admitted free of duty, must therefore produce the unavoidable consequence of driving British cultivators from the market; a great proportion of the arable land in the country must be restored to nature; the vast capital which has been laid out on it must in a few years be lost, and the agricultural interest essentially injured. And where will the manufacturers find any compensation for the loss of their markets by the extended sale of manufactures abroad? Will the cultivators of the Volga and and the Vistula ever consume as much per head of British manufactures, as those of Kent or of East Lothian? If not, are we not straining after a remote, uncertain, and contingent benefit,—are we not sacrificing the interests of our neighbours and countrymen, who consume ten times as much of our productions as foreigners,—and the market afforded by whose industry is steady, certain, and constantly increasing, to those of, states whom we rob our own to pay, and who, in return, may eventually become our enemies.

In forming an opinion between these two sets of arguments, the first object of inquiry, as Mr Alison justly observes is, " Whether the advantages of a free trade in grain are likely to be as real, and its disadvantages as chimerical, as its advocates imagine ?"

Would unrestricted importation of foreign grain really and truly *lower*, in the long run, the money price of provisions to British labourers ? This is extremely doubtful. Nay, it may be argued that it might have a contrary effect, and *raise* the price to the British consumer. At first a considerable fall would be the consequence, because the British farmer would be brought into competition with a great body of producers, who raise their produce from richer soils, and under finer climates, or with less cost. But would this effect be permanent ? At the end of five or seven years, would grain remain at the same low price to which a sudden foreign influx had reduced it ? It would not. The immediate effect of the depression would be the throwing a large portion of British arable land out of tillage ; inferior soils would cease to be cultivated altogether ; and heath and broom would reassert their sway. This would, and must take place, for although rent and wages might be eventually forced down, by necessity, to the lower level induced through change of prices ; yet this would only take place after a protracted course of suffering, and after the destruction of a large part of the capital now employed in agriculture.

It is clear, therefore, that nothing could be gained by such an experiment, save an alteration in the class and in the nation by whom our subsistence was to be furnished. Home-growers would be depressed, and foreign growers encouraged. Markets would not overflow, but would be only competently supplied, and would depend partly on foreign, instead of domestic, industry. In proportion as Poland and Russia produced more for the British manufacturers, Great Britain and Ireland would produce less; and if farming, to the extent of three millions of quarters annually, were destroyed in the British isles, farming to a similar extent would be called into existence elsewhere. But there could be no permanent increase of supply over demand. Foreign competition would do for British agriculture, what our manufactures have often done for those abroad, namely, produce a total destruction of a large part of the deluged branch of industry.

On this point, the fundamental error of the corn-law repealers consists in the supposing two things to co-exist, which never can co-exist in the same country, or even in the same district of country,—permanently reduced wages, and a permanently overflowing supply. Common-sense and experience demonstrate the position to be chimerical. No such result can permanently take place; although it may, and often does, for a limited season. The manufacturers well know this when the question regards themselves. They say, give us a free importation, and by the superior cheapness of our manufactures we will extinguish the production of every competing state. They blame, and justly, the British Government for having neglected to stipulate for the advantage of importation at moderate duties, with the other countries with whom we have concluded reciprocity treaties; but they do not see—most strange to say—that a similar result must ensue from the unrestricted importation of foreign grain into the British harbours; and that the same necessity which would compel one half of the ironmasters of France to extinguish their furnaces, were the hardware goods of Birmingham and Carron admitted there duty free, must compel the British farmer to withdraw the plough from a great part of our lands were Polish grain so admitted into our harbours.

Mr Alison holds it, therefore, as clear, that the repeal of the corn-laws would necessarily occasion a great increase of foreign, and a great diminution of British agriculture; and the question comes to be, " would such a state of things afford any guarantee for a considerable or permanent reduction in the price of the necessaries of life to the working classes of Great Britain? Such an expectation is foundationless. The impetus given to foreign agriculture would instantly and considerably raise the price of foreign grain, and in the same proportion lower the price of British. Polish wheat would rise from 25s. to 35s. a quarter, and British fall from 55s. to 45s., or perhaps 40s. But even this would not continue. The British grower would be gradually beat out of the market; yielding to the effect of a competition which he could not withstand; and the foreign grower would monopolize it. What next? The competition being at end, prices would gradually rise again. The banks of the Elbe and Vistula would wave with luxuriant harvests, while those of the Thames, the Mersey, and the Clyde, returned to a state of nature. This is clear; but it is by no means so clear that the mechanic of Manchester or Glasgow would be eating cheaper bread because the grain from which it was made grew in Poland, and not in his own country.

There is no disputing this principle; and, indeed, as Mr Alison says, its practical working is of every day occurrence wherever we find masses of population. Take coal, for example. If coal is raised in the immediate neighbourhood of a large town, as it is in Birmingham, Newcastle, or Glasgow, and a railway or canal be opened by which that article is suddenly thrown into it in vast quantities from a more remote mineral district, where the cost of production is not a third of what it is in the crowded avenues of a great city, what is the effect? Not that both parties continue their operations, and the citizens benefit by the continued competition; for, after a short and severe struggle, one or other is driven from the field. The party who can produce the cheapest article ultimately prevails; and the moment he is relieved of his antagonist, he raises the price on the defenceless consumer. The same thing holds true of steamboat competition in supplying large towns with staple commodities from great distances; but although a great reduction of price was the immediate consequence, no permanent alteration in the value of these articles has taken place.

Supposing, however, that these effects would not take place; supposing that the unrestricted admission of British grain permanently lowered its price to the consumer, would any benefit, in the end, accrue to the working classes of Great Britain? They would certainly, could they succeed in maintaining their money-wages at the existing level; but, even then, the destruction of the agriculturing classes would recoil upon them with a withering force. The thing, however, is impossible. If a permanent reduction in the price of the necessaries of life take place, the money-wages must come down also. That rate is dependent on the price of provisions, and is regulated by it,—other things being equal,—from ten years to ten years. If the money price of foreign grain is, by free importation, reduced one-half, the ultimate result will be the falling of wages one-half also. It must be so; for did this effect result from no other cause, it would inevitably be brought about by the great impulse given to population, and consequent multiplication of labourers under the influence of undiminished money-wages, augmented ease of circumstances, and increased durable fall in the price of provisions.

Present circumstances and past history alike demonstrate this important fact. At the Norman Conquest of England wheat was from 3s. 6d. to 5s. a quarter; but the labourers were infinitely poorer than what they are now; for they had only a penny a-day in harvest, and only one halfpenny a-day during the remainder of the year. Look at Poland and Russia! provisions are incomparably cheaper there than here; but are the peasantry of these countries half as comfortably fed, lodged, or clothed as our own? No; they are the most miserable labourers on the face of the earth. In the midst of splendid crops, which they rear for other nations, they feed upon scanty meals of rye-bread. From the total want of a market, wheat is often 10s. a quarter in the southern provinces of Russia; but on that very account wages are so low that the Cossack horseman gets only 8s. 6d. a-year as pay from government. Wheat and provisions of all sorts are much cheaper in Ireland than in Great Britain; but we all know that their labourers have not one-half of the comforts or necessaries of ours. In Hindostan and China, the mere necessaries of life are sold almost for nothing, yet, instead of benefiting the labouring classes, they are so poor that they scarcely ever taste any thing but rice and water. Such examples prove how absurd is the common opinion, that permanently low prices necessarily produce comfort to the working classes, and shew that Adam Smith was much nearer the truth, when he remarked that " high prices and plenty are prosperity, low prices and want, adversity."

There is no one proposition, however, in political economy, as Mr Alison justly remarks, which will be more readily conceded by the well-informed, or more obstinately resisted by ordinary observers, than the one we have been just considering. They observe for a season, or even for a sequence of seasons, if they be fine, that low prices and prosperity go hand in hand, and that the poorer classes obtain the full benefit of the reduction; and they, consequently, hold their position as established. The difficulty of convincing them of their error is also much increased by the fact, that though the money-wages of labour necessarily sink, in the long run, with the fall of provisions, and, consequently, the well-being of the people has, in the end, no connection with the money-price of provisions, yet the *density* of the population and the *capacity of the state* to maintain in comfort an increase of inhabitants, are, in a great degree, dependent on the fertility of the soil, and the money-price at which food can be obtained. But, although the capacity of the soil is a most important element, when we consider the means of future increase among a people, it is no test whatever of their present or future prosperity: and this is seen but too plainly when we look at the Irish Catholics swarming in rags and poverty in one of the richest and most fertile soils in Europe, while the Scottish peasantry are living in comparative affluence and comfort on a churlish land and under clouded skies.

Another great argument of the corn-law repealers, and equally unfounded as those we have been considering, will be found in their axiom, that " a free trade in grain with the Continent would immensely extend the market which would be opened up for our manufactures in the states benefited by our purchases." Before these gentlemen, however, make their hare-soup, we would advise them to take Mrs Glass's advice, and first catch their hare. How do they know that the great grain countries, Russia, Poland, and Prussia, will ever make any concessions in return for the favour of our taking their produce? Have they ever hitherto done so? No. All past experience shews that they will gladly accept any relaxation on *our* part in favour of *their* agriculture, but as strenuously resist any relaxation on *their* part in favour of *our* manufactures. *Their reciprocity*, as Mr Alison remarks, is all on one side. They will take every thing, and thank you; but they will give nothing. This may be absurd, and in the end impolitic on their part; but the fact is undeniable; and we have to do with mankind as they *are*, and not as they *should* be. Here are a few of the proofs.

> "We abandoned our navigation laws in order to conciliate Prussia, and she immediately met us with the Prusso-Germanic league, which arrayed five-and-twenty millions of Germans in a hostile commercial combination against this country, and practically loaded all British manufactures, through the whole extent of their territories, with an *ad valorem* duty practically amounting to fifty per cent. We equalized the duties on French and Portuguese wines in the hope that the Cabinet of the Tuilleries would make a similar concession in favour of the manufactures of this country; but we have looked in vain for any reduction of the French duties on British iron or cotton goods. We concluded a reciprocity treaty in 1826 with Sweden and Norway, as usual all on one side; and hardly a year has since elapsed which has not been marked with a fresh imposition of duties on British goods and manufactures in the Scandinavian harbours. We have taken Belgium and Portugal under our peculiar protection, and, in fact, solely propped up their existence during the last seven years; and, in return, they have loaded our manufactures with such progressively increasing duties, that the British exports to both these countries are now L.600,000 a-year less than they were prior to 1830, when our revolutionary protection commenced. These facts demonstrate on how precarious a footing any hopes are rested of our obtaining any concessions in favour of British manufactures from any relaxation, how important soever on our part, on foreign agricultural industry, and how obstinately other nations cling to the system of prohibitory protections to their own manufactures, notwithstanding the most unreserved advances on our part to a more liberal system of commercial policy."

Say, however, that the thing were otherwise, and that we had a perfect security; that, if we abolished the duties on foreign corn, we should succeed in obtaining a free market for our goods in the northern states, can we suppose, and that is the point, that such extension of the foreign market would, on the whole, benefit British manufactures. Most assuredly it would, could we suppose that our manufacturers could retain the home market for their produce at its present level. But such an idea is chimerical. The transference of our orders for grain from our own to foreign growers would necessarily induce as great a *diminution in the home market* for our manufactures, as it occasioned an *increase in the foreign*. Nothing can be clearer; yet the thing is continually overlooked by the league folks, who open widely their eyes to the foreign sale for our manufactures, but wilfully shut them to the simultaneous decline in the home market. If the quantity required by the wants of our people remain the same, is it not clear as arithmetic, that no advantage can accrue to us from transferring our encouragement from our own to foreign farmers? If the Polish cultivators, by getting our money for their grain, become so much richer, that they are thereby enabled to buy a greater quantity of our manufactures, it is surely as evident, that the British farmers would be impoverished exactly to the same corresponding degree, and just purchase so much less than they now do. In short, the thing is worse than robbing Peter to pay Paul; for what we are taking from our friends we may be giving to our foes.

But bad as our view of the case has been for the anti-corn-law party, the argument has been put a great deal too favourably for them, as nothing can be clearer than that, by transferring our agricultural patronage from our own shores to those of the Vistula, the extension of the market for our manufactures, by the increased wealth thrown into foreign states, would bear no sort of proportion to the certain diminution of the home market from the depression of our agriculture. The sharp-eyed Adam Smith long ago saw and said, that the most profitable trade was that carried on between town and country, and that our home market was worth all foreign ones put together. Our own people purchase our own manufactures in the first place, and foreign luxuries only in the second. The principal consumption in foreign countries is of their own articles of luxury. British manufactures are a necessary to the British farmers and cultivators; but to foreign landholders and cultivators these are unknown luxuries. Consequently a large portion of the agricultural wealth of the

Continent will be spent on Continental luxuries, and a comparatively small proportion on articles manufactured in the British islands.

From the most correct calculations recently made, the agricultural produce annually raised in Great Britain and Ireland amounts in value to two hundred and forty millions sterling; the total of manufactures to only one hundred and forty-eight millions. Nothing can more strongly demonstrate how much superior still the agricultural is to the manufacturing interest, notwithstanding the enormous increase of handicrafts of all sorts of late years; but also the essential injury which would be inflicted upon our manufacturers themselves, if, by a change of agricultural policy, any serious diminution were to take place in the demand for our farm produce in the home market. In proof of this, it appears that the total export of British manufactures, on an average of three years, ending 1837, two of which were the most prosperous ever known, was about L.48,500,000; and therefore that *considerably more than two-thirds of our whole manufactures are raised for the supply of the home market.* The total wealth of the British islands amounts to above five hundred millions a-year, and hardly a twelfth part of this is produced by the export sales of our manufactures. They therefore bear no proportion, whether in point of magnitude or importance, either to the agriculturists or the manufacturers for the home market. The farmers produce at least five times, the manufacturers about double, the value annually created by the manufacturers for the export sales. Nothing short of insanity, therefore, could ever prompt any legislature to injure the interests of a class producing nine-tenths of the national wealth, for the sake of one creating only one-tenth.

If we survey the different employments of our population, we come to the same results. From the population returns of 1821, we find that the families employed in manufactures are 300,000 less than those employed in agriculture, or who gain their subsistence in other ways. "Keeping therefore in view," says Mr Alison, "that the produce of British agriculture is in round numbers two hundred and fifty millions sterling, while that of British manufactures is only one hundred and fifty; and that of the latter branch not more than fifty millions are raised for the export sale, it may reasonably be presumed that, of the neutral class, the dependents on agriculture and home manufactures will be divided from the dependents on foreign manufactures nearly in the same proportion; or, in other words, not more than a twelfth part of the neutral class can be considered as dependent on foreign manufactures." In short, it is demonstrable that all the farmers dependent upon our foreign manufactures form not a fifth part of those dependent upon the agriculture and home manufactures of the kingdom; and that, even were we to add to the latter class the whole of those employed in the foreign trade connected with our export manufactures, it would be found that the population employed in agriculture and the home trade is at least six times as numerous as those engaged in the manufactures for the foreign markets.

Nor is it a circumstance unworthy of remark, that, while we find the working classes so exceedingly willing to impose on the farmer the burden of unrestrained foreign competition, we hear little from them of the propriety of admitting French silks, Swiss chintzes, Silesian calicos, or Saxon cloths, on the same terms to the British market, as they would wish Polish wheat to be. But, even were this the case, the farmer and the manufacturer do not stand upon equal ground,—for British manufacturers are much better able to withstand a free importation with foreigners than the British cultivators are. In capital and in machinery, England is far in advance of every other country in the world, and these are capable of effecting an almost indefinite reduction in the prices of the goods manufactured; but they can effect little in reducing the prices of the necessaries of life. Indian cotton, manufactured in Glasgow or Manchester, can undersell Hindoo manufacture in the Hindoo market, where the native labourer receives only threepence a-day; but we have yet to know that profit could be made by exporting British wheat to Danzig.

The manufactures raised for the export sale are not a half of what are consumed regularly in the home market; therefore our home market is twice as valuable, even setting aside national considerations. But, when we take these into view, we naturally ask, who are they that compose the foreign, and who are they that compose the home market. The foreign consumers are individuals, in great part owing allegiance to independent potentates, who are, have been, or may be, our inveterate enemies. The home consumers are our brothers and friends, bone of our bone and flesh of our flesh, the sinews of our strength in maintaining our independence against foreign invasion. If, by unrestricted importation, we are doubling the growth of corn abroad, we are, in a corresponding degree, crippling our agricultural prosperity at home; we are weakening and depressing every branch of the community; we are cutting off the most profitable market for our own industry; we are augmenting our national and parochial burdens; and disabling the state from maintaining the contest against foreign aggression,—for we are thus adding to the power and resources of those who are to form our enemies.

There is not the slightest foundation, as Mr Alison well observes, for the opinion entertained by many superficial, and even by some well-informed, persons, that such is the magnitude of our manufacturing population that the growth of our own country must soon become inadequate for supplying us with grain. In 1827, there were 46,500,000 arable acres in Great Britain and Ireland under cultivation, and 15,000,000 uncultivated but capable of improvement, being about two acres under cultivation for each inhabitant. The average produce of every cultivated acre is about two quarters. The total amount of subsistence from forty-six millions of acres would be ninety-two millions of quarters. Fifteen hundred thousand horses in the united empire are sustained on this produce, each horse being reckoned to consume as much as eight men, consequently consuming annually twelve millions of quarters. It is supposed that the herds and flocks fed for market consumed double this quantity, or twenty-four millions of quarters annually. Yet there would still remain land capable of producing sixty millions of quarters a-year, at a very moderate computation. This would maintain three times the present population of Great Britain and Ireland, without taking at all into view the probable cultivation of the fifteen millions of waste acres, or the probable improvements in agriculture, which, especially by the recent introduction of thorough draining, may be expected to add a half to the supposed estimate of four bolls per acre.

Upon principles incapable of overthrow, it is therefore evident that Great Britain contains within herself the elements of maintaining three times her present population; and therefore all idea of our population out-growing our means of subsistence is chimerical and palpably absurd. On the other hand, if three times the quantity of present produce may be extracted from our soil, triple the rent for our manufactures might be obtained in the home market; yet, even in its present infantine state, this takes off a hundred millions worth of our home fabrics,—being double the amount of our whole foreign exports. The risk of injuring this interest for one much less valuable, and held by a much more precarious tenure, is worthy only of the wrong-headed and illogical set who, mistaking their limited and circumscribed views for true philosophy, would, like the dog in the fable, drop the substance to grasp at the shadow.

Mr Alison allows, indeed, and with the candour which marks all his views, that British produce, from vicissitude of seasons and other circumstances, is liable to variation in price, and that continued bad seasons may induce a scarcity bordering even upon famine. Granted,—but here our corn-laws come into operation, and hence their use.

The beneficial effect of the present corn-laws is here seen. By it a permanent granary is provided for the people, when the home supply has proved deficient, and which, without it, could not have existed. When grain rises to seventy-two shillings a quarter, a certain reserve of foreign produce is provided into bonded warehouses of the kingdom, which at once becomes available; and thus, if the foreign harbours are left open, it can scarcely rise above this price. Speculators purchase up grain abroad, looking to this contingency, and store it up in British warehouses. During seasons of plenty this ample store lies innocuous to the British farmer, for it is not required by the British consumer; but, when the season of scarcity arrives, it issues forth to avert the calamity and diffuse plenty through the land.

It is clear that, if a free importation of grain was permitted between Great Britain and the Continent, these great bonded reservoirs could not exist. Our population would be fed by foreign instead of British cultivators; and the British warehouses of Danzig wheat would be emptied at the first rise of prices, as soon as the farm yards of our own cultivators. Thus the supply would soon become equal to the demand; for the British supply would be diminished as the foreign supply augmented; and when a season of scarcity arrived, no reserve store would be found for the wants of the people. The present corn-law, however, effectually provides for this desideratum. While it prohibits importation in ordinary seasons, it permits any quantity of foreign grain to be stored up in our bonded warehouses, thus preserving the surplus produce of the Continent in years of plenty to be set apart for our use in years of scarcity.

It has been proved that the nations from whom we import grain will not receive our manufactures. They will take nothing but *gold* for their *grain.* Only those from whom we import *luxuries* will take our *manufactures.* Will Poland, Prussia, and the southern provinces of Russia, take our manufactures for their grain? No such thing. They would not do so even were we to repeal our corn laws; and for the obvious reason, that they have an indelible jealousy of our manufacturing greatness. They can never hope to rival us, except by a rigid system of exclusion; and this they must put in practice at all hazards. Look at our navigation laws! What have we gained by their repeal? Have they diminished the duties on any one branch of British produce? No, they have gone on increasing them; so that our exports to the northern states of Europe are less than they were eight and thirty years ago. No doubt, they would willingly admit our grain on the same terms as we admit their grain; and this they call reciprocity; but will they extend this treaty by admitting our cotton and iron goods free of duty? Look at the Prusso-Germanic League, by which, in consideration of the English having taken off all restrictions on the entrance of foreign shipping into their harbours, Prussia imposed a duty practically amounting to fifty per cent. on every article of British manufacture.

The countries which lie in a different latitude, and have no jealousy of us politically or commercially, such as America, the East and West Indies, Brazil, Australia, and Turkey, admit our manufactures without any such drawbacks. But to the production of wheat or cotton, tea or sugar, wine or fruits, oil or spices, coffee or tobacco, our iron or cotton establishments are no subjects of jealousy. The greater our manufacturing prosperity, the better for them,—as they obtain our articles at a cheaper rate, and procure a larger market for their own. Consequently, so vast is the effect of this liberal admission of our goods on the extent of our foreign exports, that, while every inhabitant of America takes annually nineteen and sixpence worth of British manufactures,—of the West Indies three pounds ten shillings worth; and of Australia eleven pounds worth; the Prussian takes only threepence, and the Russian sixpence worth. Hence it is that a large export of our manufactures in seasons of plenty, and corresponding import of luxuries, produces no drain from the banks, and no shock to commercial credit; whereas a great importation of grain in bad seasons, being necessarily paid for in specie, is immediately attended by both of these disastrous consequences.

The repeal of the corn-laws would be the source of a perpetual drain upon our currency. What would be the effect of eight millions of specie annually drained from the nation to purchase foreign grain? We would have the screw perpetually applied by the Bank of England to the currency, in order to preserve its own solvency; all subordinate banks contracting their issues, and pressing their customers for payments—distress throughout the trading classes—decline of revenue from the progressive decline of exports and imports; and, consequently, new taxes upon the comforts or necessaries of life to make up the deficiency. These anticipations are not chimerical,—they have been realized by the experience of the last two years; the operation of these very principles has reduced hundreds on hundreds of the anti-corn law clamourers themselves to bankruptcy, and has landed hundreds of thousands of the multitudes whom they strove to delude in the workhouse.

The true policy of Great Britain on these subjects is therefore clear. Mr Alison shews that it consists in three great maxims,—agricultural protection, to create sources of wealth in the heart of the empire, and secure the independence of the people from foreign supply;—colonial encouragement to afford a vent, and extend a market for our growing manufactures ;—and the maintenance of a powerful navy, at once to protect our shores and our commerce.

We had intended making a few observations on the concluding section in Mr Alison's book relating to the future increase of the human race, but our analysis of his admirable and unanswerable views on the corn-laws has extended to a greater length than we anticipated. We trust, however, that the importance of the subject, and the wild and uninformed agitation at present prevailing regarding it, will amply plead our apology.

We cannot take leave of Mr Alison's work without again giving our humble but most cordial tribute of praise to its vast information and its enlarged views. It throws a flood of light on the various and important subjects of which it treats,—subjects so deeply interesting to individuals as well as to nations, and out of which are woven the fabrics of human society.

QUARTERLY AGRICULTURAL REPORT.

February 1841.

The last quarter has exhibited in its weather some remarkable features. For more than the half of December the sun shone brightly every day, accompanied with a most exhilarating but gentle westerly breeze, and a steady and rather low, though not frosty, temperature, ranging from 45° to 35°. Severe weather immediately succeeded, with easterly wind, and has continued with greater or less severity until about a week ago, when a thorough fresh ensued, with a mild westerly wind, and a temperature varying as high as from 40° to 48°. In the wintry portion of the weather the frost was sometimes very intense, as low as 11°, and frequently not exceeding 28° during the day. Some snow fell at intervals, the quantity varying much in different localities. Around Edinburgh the fall was trifling ; in England it was much greater ; and among the Grampians so heavy a fall, it is stated, has not occurred for some years. The sports of skating and curling have not been so much enjoyed for many years. The breaking up of the storm has occasioned severe losses by extraordinary inundations, both in England and the north of Scotland. The air has felt like spring for the last week from this date (16th), and an earnest of its approach may be recognised in the blackbird and thrush having already begun his vernal love-song.

The young wheat and grass, on reappearing from under the snow, display a very lively green. On those parts of fields, however, which seem comparatively bare of snow, it is not improbable that both plants have somewhat suffered from the severity of the frost. The season of trial for them has yet to arrive in March. In many cases, we fear, the stock must have had little else than frozen turnips to eat. When there was so long dry and beautiful weather in December, it was inexcusable in those farmers who neglected to store a plentiful supply of turnips for their stock during the storm. This is a matter, we regret to observe, which is too little attended to by our farmers, though they are very ready to express regret at their oversight when a long storm overtakes the turnip fields. Latterly the turnip sheep must have suffered, and we understand that those on the hills have felt the storm severely.

The epidemic amongst the cattle and sheep has been passing gradually towards the north, but unattended with fatal results, when the least attention has been paid to remedial means. Professor Dick's experience and opinion of this disease will be found in the Society's Transactions.

Little need be said at present of the corn markets. There has been a steady supply of all sorts of grain, and in consequence the price has remained very steady. On comparing the prices with those of last year, it will be seen that the price of wheat at Mark Lane on Friday, Feb. 5. 1841, was 60/9, and on Friday Feb. 7. 1840, it was 65/2, being 4/5 per quarter lower this season.

A measure is about to be introduced into Parliament which deserves the attention of the agricultural interest; we mean the equalization of the import duties on sugar. Hitherto the West India Islands have enjoyed an advantage in the duty on sugar; but now that the long-predicted decrease of the produce of those colonies, as a consequence of the lethargic habits of the negro population, has actually taken place to a very considerable extent, in order to keep up the supply it is expedient to introduce sugar from our East India Colonies, by lowering its duty, in preference to depending on the sugar colonies of foreign states. Hitherto the quality of the sugar from the East has not equalled that from the West, both on account of the inferiority of the sugar-cane itself, and of the machinery required for its manufacture. With an improvement in these respects the sugar of the East should be as good as that of the West; but as such an improvement must take time, we must make up our minds in the mean time to consume a large quantity of an inferior article for some years to come. The interest which the agriculturists of this country have in the question is an indirect one; they have none in the sugar, but in the rum distilled from it; and in so far as the supply of that spirit may affect the market, its quantity is entirely limited by the extent of the culture of sugar. But fear is entertained that an inferior sort of spirit, to be mis-called rum, will be made in the East from rice, and imported into this country at such a price as to injure our own distillers, and through them our barley growers. This inferior article, it seems, can be distilled for 6d. per gallon, and its freight hither is only 9d. a gallon, so that it can be sold in this country at a profit for little more than 1s. 3d. per gallon. If this be the case, what with our high excise duties on spirits and malt, we suspect that our distillers will have little chance in such a competition. Influential agriculturists should therefore pay attention to the matter, and instruct their representatives in Parliament accordingly.

THE REVENUE.

ABSTRACT of the Nett Produce of the Revenue of Great Britain, in the Quarters and Years ended on the 5th of January 1840, *and 5th of January* 1841,—*shewing the Increase and Decrease on each head thereof.*

	Quarters ended Jan. 5.		Increase.	Decrease.	Years ended Jan. 5.		Increase.	Decrease
	1840.	1841.			1840.	1841.		
	£	£	£	£	£	£	£	£
Customs, ...	4,779,305	4,350,906	. .	398,399	19,840,213	19,754,340	. .	85,87
Excise, ...	3,427,271	4,016,366	589,085	. .	11,952,252	12,574,562	622,310	. .
Stamps, ...	1,587,061	1,596,646	9,585	. .	6,574,461	6,735,902	161,441	. .
Taxes, ...	1 584,699	1,786,771	. .	. .	3,711,794	3,946,444	234,650	. .
Post-Office, ..	351,000	98,000	202,072	253,000	1,519,000	441,000	. .	1,078,000
Miscellaneous,	58,800	52,437	. .	6,363	246,610	245,616	. .	99
	11,788,136	11,901,126	800,742	657,762	43,844,330	43,697,864	1,018,401	1,164,867
	Deduct Decrease,		657,762		Deduct Increase,			1,018,401
	Increase on the Qr.		142,980		Decrease on Year,			146,46

TABLES OF PRICES, &c.

The Average Prices of the different kinds of GRAIN, per Imperial Quarter, sold at the following Markets :—

LONDON.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 6.	66 2	38 6	23 0	36 6	42 10	42 6
13.	63 11	36 10	22 4	35 10	43 2	42 2
20.	65 9	37 9	22 1	35 8	43 8	43 9
27.	63 3	35 8	22 9	35 4	43 3	42 10
Dec. 4.	61 10	35 9	22 6	34 6	42 9	42 0
11.	60 7	34 1	22 7	34 10	42 6	42 6
18.	60 9	33 5	21 11	34 9	41 8	41 8
25.	63 9	34 9	21 0	34 2	40 10	41 3
1841.						
Jan. 1.	65 1	34 2	22 5	33 8	40 6	41 2
8.	66 6	35 8	22 7	33 6	41 2	40 6
15.	65 9	36 3	22 6	32 10	40 8	40 10
22.	65 6	36 0	21 10	33 8	40 2	40 7
29.	64 1	35 6	22 0	34 2	39 8	40 9

DUBLIN.

Date.	Wheat per Bar. 20 St.	Barley per Bar. 16 St.	Bear per Bar. 17 St.	Oats per Bar. 14 St.	Flour per Bar. 9 St.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 3.	31 1	14 5	10 9	10 7	21 7
10.	31 5	14 6	10 11	10 8	21 2
17.	31 6	14 1	11 3	11 6	21 0
24.	32 0	14 4	11 5	11 9	21 2
Dec. 1.	32 8	14 6	11 2	11 6	21 4
8.	31 6	14 5	11 1	10 7	20 8
15.	32 2	14 6	11 2	10 6	20 4
22.	31 7	13 10	11 6	11 2	20 6
29.	31 4	13 8	11 2	11 4	20 4
1841.					
Jan. 5.	31 2	13 9	11 3	11 8	20 10
12.	31 6	14 0	11 0	10 9	20 4
19.	32 4	14 2	10 10	10 6	20 6
26.	32 6	14 4	11 4	10 6	20 8

LIVERPOOL.

Date.	Wheat.	Barley.	Oats.	Rye.	Pease.	Beans.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 6.	60 9	33 2	20 8	36 2	46 2	47 0
13.	56 9	29 5	20 5	35 9	45 9	47 1
20.	54 7	30 6	21 1	36 6	44 6	44 0
27.	54 8	33 4	20 6	36 2	45 9	47 0
Dec. 4.	56 10	29 10	21 7	35 8	46 6	46 6
11.	56 0	33 6	21 2	34 10	45 2	44 9
18.	58 6	28 0	21 7	34 6	44 8	45 10
25.	57 2	29 6	22 2	33 2	43 6	42 0
1841.						
Jan. 1.	61 10	32 6	21 8	33 6	42 10	44 5
8.	56 8	33 0	21 10	34 8	43 0	42 6
15.	57 2	34 2	21 4	34 10	42 8	44 2
22.	56 7	32 9	21 8	35 2	42 6	42 10
29.	59 5	35 10	21 3	34 4	43 4	44 7

EDINBURGH.

Date.	Wheat.	Barley.	Oats.	Pease.	Beans.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov. 4.	65 6	32 0	24 6	46 3	46 0
11.	64 4	32 3	25 4	46 9	46 3
18.	62 4	31 2	25 6	47 0	46 6
25.	60 6	30 1	23 10	44 2	44 0
Dec. 2.	58 6	29 0	22 6	38 0	37 6
9.	58 4	29 3	23 8	38 2	37 8
16.	60 0	30 4	23 6	38 1	37 6
23.	59 6	30 2	23 4	38 0	37 4
30.	59 3	29 2	23 2	38 0	37 2
1841.					
Jan. 6.	59 1	30 2	23 0	37 6	37 0
13.	59 0	30 0	23 0	37 4	37 0
20.	59 2	29 6	23 10	36 8	36 0
27.	58 6	29 10	24 8	37 6	37 0

TABLE shewing the Weekly Average Prices of GRAIN, made up in terms of 7th and 8th Geo. IV. c. 58, and the Aggregate Averages which regulate the Duties payable on FOREIGN CORN ; the Duties payable thereon, from November 1840 *to February* 1841.

Date.	Wheat.			Barley.			Oats.			Rye.			Pease.			Beans.		
	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.	Weekly Average.	Aggregate Average.	Duty.
1840.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Nov 6.	62 1	63 0	23 8	34 8	35 10	9 4	22 8	23 5	12 3	36 7	36 5	15 6	42 4	43 2	5 0	43 7	44 6	3 6
13.	62 2	62 7	24 8	34 8	35 7	9 4	22 0	22 11	13 9	35 8	36 7	15 6	42 0	43 0	5 0	44 0	44 2	3 6
20.	66 8	62 2	24 8	34 7	35 3	9 4	21 11	22 7	13 9	35 8	36 6	15 6	42 10	43 0	5 0	43 10	44 1	3 6
27.	60 0	61 8	25 8	33 6	34 10	10 10	22 2	22 5	13 9	34 10	36 2	15 6	43 0	43 7	5 0	43 9	43 3	5 0
Dec 4.	59 7	61 2	25 8	32 7	34 3	10 10	22 1	22 2	13 9	34 11	35 10	16 9	41 11	42 9	6 6	42 4	43 7	5 0
11.	58 10	60 9	26 8	32 0	33 8	12 4	21 11	22 1	13 9	34 4	35 4	16 9	40 1	42 4	6 6	41 4	43 0	5 6
18.	59 1	60 3	26 8	31 6	33 2	12 4	21 4	21 11	15 3	32 10	34 9	18 3	40 5	41 10	8 0	41 1	42 7	6 6
1841. 25.	60 1	61 10	26 8	32 4	32 9	13 10	21 5	21 10	15 3	33 5	34 4	18 3	40 1	41 6	8 0	40 9	42 1	6 6
Jan 1.	61 8	59 10	27 8	32 11	32 8	13 10	21 6	21 9	15 3	32 7	33 10	19 9	41 2	41 2	8 0	40 1	41 5	8 0
8.	61 9	60 2	26 8	33 6	32 6	13 10	21 7	21 6	15 3	32 6	33 5	19 9	39 11	40 7	9 6	39 10	40 11	9 6
15.	61 7	60 6	26 8	32 10	32 6	13 10	21 8	21 6	15 3	35 5	33 6	19 9	39 10	40 3	9 6	40 3	40 7	9 6
22.	60 9	60 10	26 8	32 11	32 8	13 10	21 4	21 5	15 3	34 1	33 5	19 9	38 10	40 1	9 6	39 7	40 3	9 6
29.	60 8	61 1	25 8	32 3	32 2	13 10	21 7	21 6	15 3	31 5	33 3	19 9	39 3	39 10	11 0	39 4	40 0	9 6

*The **MONTHLY RETURNS**, published in terms of 9th Geo. IV. c.* 60, *shewing the Quantities of Corn, Grain, Meal, and Flour imported into the United Kingdom in each Month; the Quantities upon which duties have been paid for home-consumption, during the same Month; and the Quantities remaining in Warehouse at the close thereof, from 5th November* 1840 *to 5th January* 1841.

Month ending	IMPORTED.			CHARGED WITH DUTY.			REMAINING IN WAREHOUSE.		
	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.	From Foreign Countries.	From British Possessions.	Total.
Nov. 5. 1840.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu.	Qrs. Bu	Qrs.
Wheat, . .	27,555 7	. .	27,555 7	9,407 0	. .	9,407 0	22,812 1	118 0	22,930 1
Barley, . .	9,414 1	. .	9,414 1	20,132 0	. .	20,132 0	36,217 4	. .	36,217
Oats, . . .	21,169 4	. .	21,169 4	15,012 5	. .	15,012 5	3,663 1	. .	3,663 1
Rye, ...	1 0	. .	1 0	1 0	. .	1 0	3,325 4	. .	3,325 4
Pease, . . .	8,245 3	402 4	8,647 7	7,968 1	402 4	8,370 5	842 0	. .	842
Beans, . .	6,366 2	. .	6,366 2	6,212 6	. .	6,212 6	844 2	. .	844 2
Totals,	71,752 1	402 4	73,154 5	58,733 4	402 4	59,136 0	67,704 4	118 0	67,822
Dec. 5.									
Wheat, . .	34,543 4	3,602 3	38,145 7	2,998 4	1,639 0	4,637 4	52,617 4	2,081 3	54,698 7
Barley, . .	16,137 2	. .	16,173 2	45,200 2	. .	45,200 2	7,063 6	. .	7,063
Oats, . . .	8,186 1	. .	8,186 1	402 3	. .	402 3	7,148 2	. .	7,148 2
Rye, ...	. .	. .	. .	. .	. .	. .	3,325 4	. .	3,325 4
Pease, . . .	23,157 6	1,841 4	25,359 2	23,466 3	1,841 4	25,307 7	904 2	. .	904 2
Beans, . . .	7,667 4	. .	7,667 4	7,576 2	. .	7,576 2	935 4	. .	935 4
Totals,	89,692 1	5,443 7	95,532 0	79,613 6	3,480 4	83,124 2	71,994 6	2,081 3	74,976 1
Jan. 5. 1841.									
Wheat, . .	34,692 4	3,384 0	38,076 4	3,178 3	1,813 0	4,991 3	81,577 3	2,152 3	83,729 6
Barley, . .	5,863 0	. .	5,863 0	4,348 6	. .	4,348 6	8,545 0	. .	8,545 0
Oats, . . .	6,349 7	. .	6,319 7	291 1	. .	291 1	9,477 7	. .	9,477 7
Rye, ...	. .	. .	. .	. .	. .	. .	3,325 4	. .	3,325 4
Pease, . . .	40,276 7	638 2	40,915 1	39,282 3	638 2	39,921 5	1,947 7	. .	1,947 7
Beans, . .	9,792 3	. .	9,792 3	99,683 3	. .	99,683 3	760 4	. .	760
Totals,	96,974 5	4,022 2	100,996 7	116,784 0	2,451 2	119,236 2	105,634 1	2,152 3	107,886 4
Nov. 5. 1840	cwt. qr. lb.	cwt. qr. lb.	cwt qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb	cwt. qr. lb.	cwt. qr. lb.	cwt.
Flour, . . .	31,985 2 12	39,566 3 26	71,552 2 10	1,928 0 26	26,538 1 25	28,466 2 23	24,086 2 14	13,273 0 9	37,359 2
Oatmeal, .	1 3 22	1,243 1 0	1,245 0 22	. .	1,243 1 0	1,243 1 0	20 2 8	. .	20 2
Totals,	31,987 2 6	40,810 0 26	72,797 3 4	1,928 0 26	27,781 2 25	29,709 3 23	24,107 0 22	13,273 0 9	37,380 1
Dec. 5.									
Flour, . . .	34,287 2 17	98,020 3 27	132,308 2 16	262 0 6	55,136 3 19	55,398 3 25	38,516 0 1	45,763 3 27	84,280 0
Oatmeal, .	0 3 14	423 2 7	424 1 21	0 3 14	423 2 7	424 1 21	20 2 8	. .	20 2
Totals,	34,288 2 3	98,444 2 6	132,733 0 9	262 3 20	55,560 1 26	55,823 1 18	38,536 2 9	45,763 3 27	84,300 2
Jan. 5. 1841.									
Flour, . . .	45,745 1 15	107,279 1 20	152,753 3 7	46 0 13	50,532 3 8	50,578 3 21	66,483 3 19	113,402 0 15	179,886 0
Oatmeal, .	1 1 4	2,377 3 11	2,379 0 15	1 1 4	845 3 12	847 0 16	20 2 8	1,531 3 27	1,552 2 7
Totals,	45,746 2 19	109,657 1 3	155,132 3 22	47 1 17	51,378 2 20	51,426 0 9	66,504 1 27	114,934 0 14	181,438 2

PRICES of BUTCHER-MEAT.

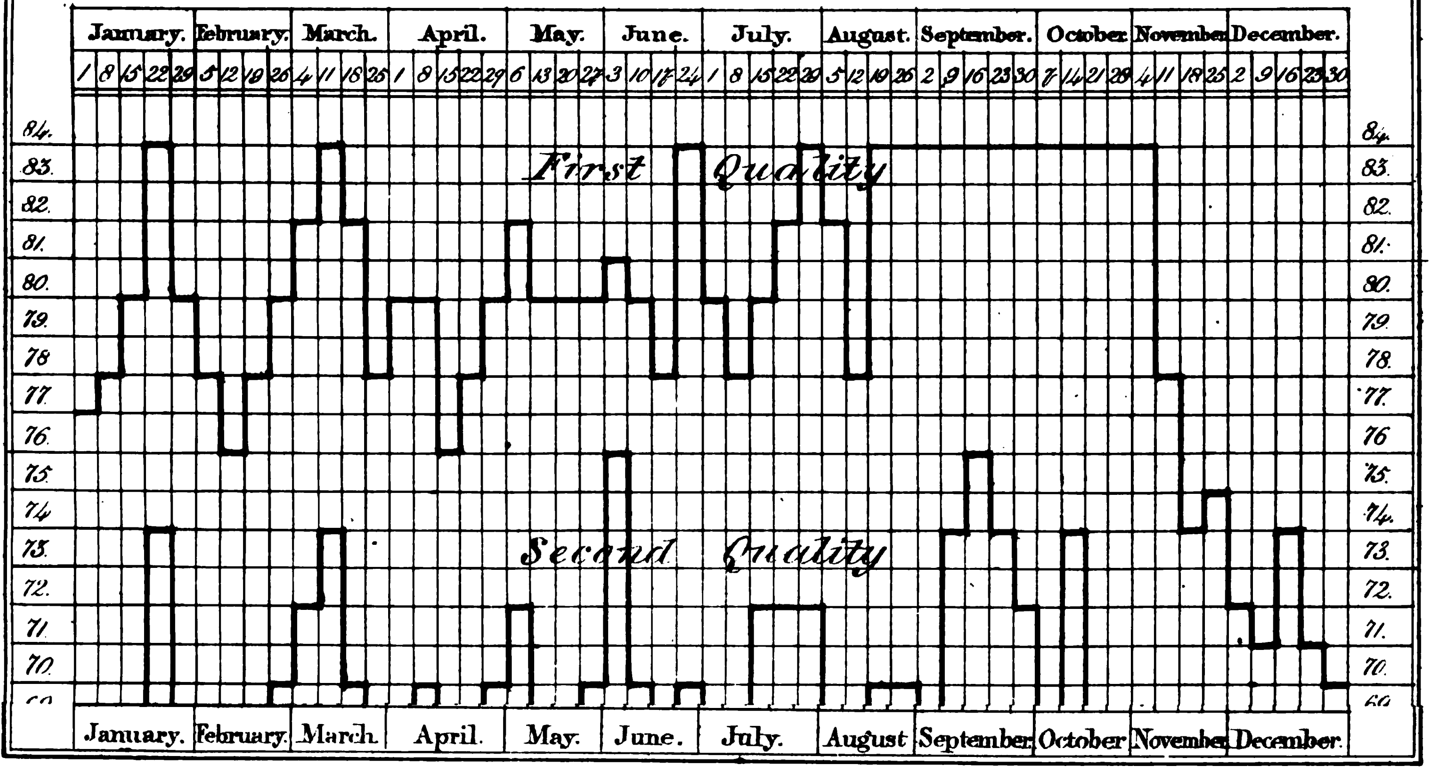
Date.	SMITHFIELD, *Per Stone of* 14 lb.		MORPETH, *Per Stone of* 14 lb.		EDINBURGH, *Per Stone of* 14 lb.		GLASGOW, *Per Stone of* 14 lb.	
	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.	Beef.	Mutton.
1840. Nov.	6/9 to 8/6	7/ to 8/9	6/9 to 7/9	6/9 to 8/	6/6 to 7/	6/3 to 6/9	6/6 to 7/9	6/9 to 7/9
Dec.	7/6 9/6	7/6 9/	7/6 8/3	7/6 8/6	7/6 8/	7/6 8/3	7/3 8/	7/6 8/6
1841. Jan.	7/9 9/6	7/9 9/6	7/6 8/	7/6 8/3	7/6 8/	7/6 8/	7/6 8/3	7/6 8/6

PRICES of English and Scotch WOOL.

ENGLISH, per 14 lb.		
Merino, ...	18/6 to	21/6
In Grease . . .	17/	20/
South Down, . .	20/	22/6
Half Bred, ...	18/	20/
Leicester, Hogg,g, . .	15/6	20/
Ewe and Hog . .	18/	20/
Locks, . . .	7/6	8/6
Moor .	6/	7/6

SCOTCH, per 14 lb.		
Leicester, Hogg, . .	15/ to	19/
Ewe and Hogg, ...	12/	16/
Cheviot, white, . . .	13/	15/
Laid, washed, . .	8/	12/
Unwashed, . . .	6/	8/
Moor, white, ...	4/6	6/
Laid, washed, ...	3/6	5/
Unwashed .	3/	4/

TABLE shewing the Price Per Quarter of the First, Second, & Third Qualities of WHEAT, in the Edinburgh Market, during the Year, 1840.



INDEX.

INDEX.

Aberdeen, account of the meeting of the Highland and Agricultural Society there in 1840, 410.

Aberdeenshire, fiars' prices of, for crop and year 1839, 139.

Ægilops, changing into wheat, 256.

Agriculture, that of France and England compared, 127—of Hindostan, No. V., on the culture of silk, 163—of the county of Cork, No. III., 182.—Society for the protection of, 273—Meeting of the Royal English Society of, at Cambridge in 1840, 274—of Fifeshire, 298—on the increasing desire to combine science with, 414—on its progress in the Garioch during the last half century, 417—on the best means of promoting and recording the improvement of, 456.

Agriculturist's Note-Book, No. XI. Remarks on Dr Ratier's method of making coffee, 81—consideration of moorband pan, 86—preserving potatoes, by Mr Robert Lymburn, Kilmarnock, 90—on acclimating cattle, by Dr James Smith, Louisiana, 92—extirpation of ferns, by Mr James Caird, Craigcaffie, Stranraer, 94—inefficient and cruel method of sweeping chimneys, 95—causes of destruction by fire, 99—the different breeds of sheep, by Mr William Hogg, shepherd, 105—feeding and dressing of tups, by Mr William Hogg, shepherd, 108—wire turnip baskets, by Mr George Buist, Bombay, 112—wire hurdles for feeding sheep on flower gardens and pleasure grounds, by Mr George Buist, Bombay, 113—rain-proof sheep-feeding troughs, by Mr George Buist, Bombay, 114—No. XII. Beet-root, 238—dogs, food for and rational treatment of, 239—Cream gauge or cream glass, 245—a peculiar mode of raising turnips, by Mr James Main, Chelsea, 247—Swedish mortar plaster cart, by Peter Möller, Esq. of Laholm and Skattorp, Sweden, 248—winning the second crop of clover, 249—which is most profitable, horse or manual labour? 252—introduction of merinos into Scotland, 254—the ægilops changing into wheat, 256—relation existing betwixt the shape of animals and the number of their pulsations and inspirations, 257—remarks on Mr Blacklock's treatise on sheep, by Mr William Hogg, shepherd, 258—fiars and average prices of wheat in Scotland for eight years, from 1832 to 1839 inclusive, by William Bell, Esq. of Hunthill, 263—No. XIII. Potato failure, by Mr James Falconer, Balnakettle, Kincardineshire, 428—destruction of sparrows, 432—draining of fens, 434—No. XIV. restraining of sand-drift, 498—reclaiming of bogs, 501—bees, 504—dogs, 511—apple-gathering, 516—rotation of crops, by Mr Towers, 519—the Scots fir, by Mr Edward Sang, Kirkaldy, 530—working of the English new poor-law, 534—onion-fly, by Mr Colin Munro, Dingwall, 540.

Alison, Esq., Archibald, his work on "The Principles of Population, and their connection with Human Happiness," reviewed, 226, 393, 597.

Animals, relation existing betwixt their shape and the number of their pulsations, 257.

Apple trees, canker in, 379—apple-gathering, 516.

Archbishopric of Glasgow, fiars prices of, for crop and year 1839, 140.

Argyleshire, fiars prices of, for crop and year 1839, 139.

Artificial hatching, on, 330.

Ayrshire, fiars prices of, for crop and year 1839, 139.

Bain, Mr D., on shelter, 320.
Banffshire, fiars' prices of, for crop and year 1839, 139.
Bees, natural history of, reviewed, 504.
Beet-root, 238.
Bell, William, Esq., his method of winnowing the second crop of clover described, 249—on fiars' and average prices of wheat for eight years from 1832 to 1840 inclusive, 263.
Berwickshire, fiars' prices of, for crop and year 1839, 139.
Bogs, reclaiming them, on Lord Palmerston's estate in Ireland, 501.
Bone-dust, on the adulteration of it, 177.
Boswell, Esq., John, on the increasing desire to combine science with agriculture, 414.
Breeds of sheep, new, 130.
Buist, Mr George, on wire turnip baskets, 112—on wire hurdles for feeding sheep in flower-gardens and pleasure-grounds, 113 — rain-proof sheep-feeding troughs, 114 — his sketch of the agriculture of Fifeshire, 298.
Butcher meat, prices of, at Smithfield, Morpeth, Edinburgh, and Glasgow, from February to April 1840, 138—from May to July, 276—from August to October, 440—from November to January 1841, 616.
Buteshire, fiars' prices of, for crop and year 1839, 139.

Caird, Mr James, on extirpating ferns, 94.
Caithness-shire, fiars' prices of, for crop and year 1839, 139.
Canker in the larch, 221, 379.
Carrot, the culture of, 268.
Cattle, cure for the prevailing epidemic amongst them, 438.
Clackmannanshire, fiars' prices of, for crop and year 1839, 139.
Clover, a mode of winnowing the second crop of it, described, 249.
Coals, waste of them, 121.
Cork, on the agriculture of the county of, No. III, the baronies of Barrymore and Kilnataloon, 182—of Fermoy, Condons, and Clongibbons, 187—of Duhallow, 197—of Orrery and Kilmore, 202—of Muskerry and Barretts, 203.
Corn-laws, defence of them, 597.
Cottage windows, 116.
Cream-gauge, 245.
Crops, on the effects produced by the chemical nature of the soil and subsoil upon cultivated, 214.
Dogs, food for, and rational treatment of, 239—on the natural history of, by C. H. Smith, reviewed, 511.
Draining, on clay or plug, 68—of fens, 434.
Drill, on rendering manures more portable and applicable by it, 141.
Drummond, Mr Alexander, on the canker in the larch, 221.
Dry-rot, Sir W. Burnet's process for the prevention of it, 127.
Dublin, prices of grain at, from 31st January to 24th April 1840, 137—from 1st May to 31st July, 275—from 4th August to 27th October, 439—from 3d Nov. to 26th Jan. 1841, 615.
Dumbartonshire, fiars' prices of, for crop and year 1839, 139.
Dumfriesshire, fiars' prices of, for crop and year 1839, 139.
Duncan, James, on the insects most injurious to vegetables and animals, and of the means best calculated to counteract their ravages, No. VII., 50—No. VIII., 362.

Edinburgh prices of grain from 5th February to 29th April 1840, 137—from 6th May to 5th August, 275—from 5th August to 28th October, 439—from 4th Nov. to 27th Jan. 1841, 615; table of prices of wheat at, from 1st January to 31st December 1840, 615; prices of butcher meat at, from February to April 1840, 138—from May to July, 276—from August to October, 440—from November to January 1841, 616.
Edinburghshire, fiars' prices of, for crop and year 1839, 139.
Elgin and Morayshire, fiars' prices of, for crop and year 1839, 139.
Emigration, on the advantages of a government grant from the Highlands and Islands of Scotland, 277.
Epidemic among cattle and sheep, recipe for its cure, 438.

Falconer, Mr James, on potato failure, 428.
Farm, on the cost of stocking a small one of 100 acres, 76.
Fiars' prices of grain in the different counties of Scotland for crop and year 1839, 139—of wheat in Scotland from 1832 to 1840, 264.
Fifeshire, fiars' prices of, for crop and year 1839, 139—sketch of the agriculture of, 298.
Fitzherbert's, Sir Anthony, "Boke of Husbandrye" analyzed, 474.

Flour, monthly returns of foreign, imported from 5th February to 5th April 1840, 138—from 5th May to 5th July, 276—from 5th August to 5th October, 440—from 5th November to 5th January 1841, 616.
Forfarshire, fiars' prices of, for crop and year 1839, 140.

Garioch, on the progress of agriculture in that district during the last half century, 417.
Gaseous substances, on their uses to vegetation, 32—carbonic acid gas, 34—oxygen, 38—nitrogen, 41—aqueous atmospheric vapour, 47.
Gaudin's light, 131.
Gentlemen whips, 121.
Ginseng, 130.
Glasgow, prices of butcher meat at, from February to April 1840, 138—from May to July, 276—from August to October, 440—from November to January 1841, 616.
Glenkens Society for improving the condition of the working classes, the tenth annual report of its proceedings, 541.
Grain, prices of the weekly and aggregate averages of foreign, from 31st January to 24th April 1840, 137—from 1st May to 31st July, 275—from 7th August to 30th October, 439—from 6th Nov. to 29th Jan.
Grain, monthly returns of foreign, imported from 5th February to 5th April 1840, 138—from 5th May to 5th July, 276—from 5th August to 5th October, 440—from 5th November to 5th January 1841, 616.
Grain, prices of, at London, Dublin, Liverpool, and Edinburgh, from 31st January to 24th April 1840, 137—from 1st May to 31st July, 275—from 7th August to 30th October, 439—from 3d Nov. to 29th Jan. 1841, 615.
Grierson, Mr William, his tenth annual report of the proceedings of the Glenkens Society, for improving the condition of the working classes, 541.

Haddingtonshire, fiars' prices of, for crop and year 1830, 140.
Halkett, Mr James, on the adulteration of bone-dust, 177.
Hannam, Mr John, on the best means of promoting and recording the improvement of agriculture, 456.
Hatching, on artificial, 330.
Highland and Agricultural Society of Scotland, an account of their annual meeting at Aberdeen in 1840, 410.
Hindostan, on its agriculture, 141.
Hogg, Mr William, on the different breeds of sheep, 105—on feeding and dressing tups, 108—his remarks on Mr Blacklock's treatise on sheep, 258.
Hops, tithe commission on them, 122.

Implements, a list of those required to stock a farm of 100 acres, 76.
Insects most injurious to vegetables and animals, and the means best calculated to counteract their ravages, No. VII., 50—forest fly, 51—sheep spider-fly, 54—bird spider-fly, 57—chequered blow-fly, 60—green-fly, 62—blue bottle-fly, 63—Anthomyia lardaria, ib.—Anthomyia meteorica, ib.—recipe for the cure of fly-struck sheep, 66—the onion-fly, 362, 540—cabbage-fly, 366—carrot fly, 367—crane-flies, ib.—meadow crane-fly, 368—wheat-fly, 372—Hessian-fly, 378.
Inverness-shire, fiars' prices of, for crop and year 1839, 140.
Iron-trade in connection with Scotland, 441.

Johnson, Cuthbert, W. on the use of gaseous substances to vegetation, 32—on rendering manures more profitable and applicable by the drill, 141—Jethro Tull and his husbandry, 342—Sir Anthony Fitzherbert's "Boke of Husbandrye," and the early English farmers, 474.

Kincardineshire, fiars' prices of, for crop and year 1839, 140.
Kinross-shire, fiars' prices of, for crop and year 1839, 140.
Kirkcudbrightshire, fiars' prices of, for crop and year 1839, 140.

Labour, horse or manual, which is the more profitable? 252.
Lanarkshire, fiars' prices of, for crop and year 1839, 140.
Larch, on the canker in it, 221, 379.
Leslie, Mr, on the progress of agriculture in the Garioch, during the last half century, 417.
Linlithgowshire, fiars' prices of, for crop and year 1839, 140.
Liverpool, prices of grain at from 31st January to 24th April 1840, 137—from 1st May to 31st July, 275—from 7th August to 30th October 439—from 6th Nov. to 29th Jan. 1841, 615.
Lockerbie sheep show, 128.
London, prices of grain at, from 31st

January, to 24th April 1840, 137—from 1st May to 31st July, 275—from 7th August to 30th October, 439—from 6th Nov. to 29th Jan. 1841, 615.
Lymburn, Mr Robert, on preserving potatoes, 90.

Macgregor, the Rev. Mr Alexander, on the advantages of a government grant for emigration from the Highlands and Islands of Scotland, 277.
Madden, Dr Henry R., on the effects produced by the chemical nature of the soil and subsoil upon cultivated crops, 214.
Main, Mr James, on a peculiar mode of raising turnips, 247.
Manures, on rendering them more profitable and applicable by the drill, 141.
Matches, sellers of them in London, 122.
Menteath, Esq., James Stuart, on a new method of feeding sheep on turnips, 1.
Merinos, on a case of their introduction into Scotland, 254.
Milburn, Mr M. M. on the four-course system of husbandry, with hints on its advantages and defects, 384.
Miscellaneous notices, cottage windows, 216—on preserving wood, 117—the consumption of opium in China, 120—gentlemen whips, 121—waste of coals, ib.—sellers of matches in London, 122—supply of water for London, ib.—tythe commission, hops, ib.—cure for slug, 124—tanning, ib.—important turnpike decision, ib.—woollen and glass cloths, 125—a cause of sturdy in sheep, ib.—starch from sago, 126.—wooden under drains, ib.—destructive effect of new wheat on sheep, ib.—Sir W. Burnet's process for the prevention of dry rot, ib.—French and English agriculture, ib.—disease in sheep, 128—Lockerbie sheep show, ib.—potatoes raised from cuttings, ib.—new breeds of sheep, 130—the Plantagenets, ib.—Ginseng, ib.—Gaudins' light, 131—sheep and their propensity to fatten, 264—cure of the scab in sheep, 266—Rohan potato, ib.—vegetative power of the sea-sand in Morecambe Bay, 267—culture of the carrot, 268—preservation of timber, 269—solar influence, 270—sowing wheat after being kiln-dried, ib.—parsley, 271.
Möller, Esq. Peter, on a Swedish mortar-plaster cart, 248.
Morpeth, prices of butcher meat at, from February to April 1840, 138—from May to July, 276—from August to October, 440—from November to January 1841, 616.
Mortar-plaster cart, description of a Swedish one, 248.
Munro, Mr Colin, on the onion-fly, 540.
Murray, Mr William, on the cost of stocking a farm of 100 acres, 76.

Nairnshire, fiars' prices of, for crop and year 1839, 140.

Oatmeal, monthly returns of foreign, imported from 5th February to 5th April 1840, 138—from 5th May to 5th July, 276—from 5th August to 5th October, 440—from 5th November to 1th January 1841, 616.
Opium, the consumption of it in China, 120,
Orkneyshire, fiars' prices of, for crop and year 1839, 140.

Palmerston, Lord, his method of restraining sand-drift, and reclaiming bogs on his estate in Ireland, 498, 501.
Parsley, 271.
Patrick, the Rev. William, on the iron-trade, especially in connection with Scotland, 441.
Peach-trees, canker in, 379.
Pearson, Mr John, on canker in larch, peach, and apple trees, 379.
Peeblesshire, fiars' prices of, for crop and year 1839, 140.
Perthshire, fiars' prices of, for crop and year 1839, 140.
Plantagenets, the, 130.
Poor, on their state, and a legal provision for them, 393.
Poor-law, on the working of the new English one, 534.
Population and subsistence, on the relation subsisting between them, 226.
Potatoes raised from cuttings, 129—failure, 428.

Quarterly Agricultural Report, May 1840, 131, Aug. 271, Nov. 435, Feb. 1841, 612.

Renfrewshire, fiars' prices of, for crop and year 1839, 140.
Revenue, abstract of it at the quarter and year ending 5th April 1840, 139—5th July, 274—5th October, 438—5th January 1841, 614.

Rohan potato, 266.
Ross and Cromarty shires, fiars' prices of, for crop and year 1839, 140.
Rotation, four course, with hints on its advantages and defects, 384—that suitable for the north-east of Scotland, 413.
Roxburghshire, fiars prices of, for crop and year 1839, 140.
Russell, Mr John, his thoughts on the improvement of seed-wheat, 210.

Sand-drift, restraining it by the planting of mat-weed, 498.
Sang, Mr Edward, on the Scots fir, 530.
Scots fir, the, 530.
Sea-sand, the vegetative power of that in Morecambe Bay, 267.
Seed-wheat, thoughts on the improvement of, 210.
Selkirkshire, fiars' prices of, for crop and year 1839, 140.
Sheep, a new method of feeding them on turnips, 1—recipe for the cure of fly-struck, 66—on the different breeds of, 105—on feeding and dressing, 108—wire-hurdles for feeding them in flower gardens and pleasure grounds, 113—rain-proof troughs for feeding them, 114—a cause of sturdy in, 125—destructive effect of new wheat on, 126—recipe for curing scabbed mouth in, 128—show of them at Lockerbie, ib.—their propensity to fatten, 264—recipe for the cure of the scab in them, 266—cure for the epidemic among them, 438.
Shelter, on, 320.
Silk, on the culture of, in Hindostan, 163.
Slug, cure for, 124.
Smith, C. H., his natural history of dogs reviewed, 511.
Smith, Dr James, on acclimating cattle, 92.
Smithfield, prices of butcher meat at, from Feb. to April 1840, 138—from May to July, 276—from Aug. to Oct. 440—from Nov. to Jan. 1841, 616.
Solar influence, the, 270.
Sparrows, destruction of, 432.
Starch from sago, 126.
Stirlingshire, fiars' prices of, for crop and year 1839, 140.
Sturdy of sheep, a cause of it, 125.
Sugar duties, equalization of them proposed, 613.
Sutherlandshire, fiars' prices of, for crop and year 1839, 140.

Tanning, 124.
Timber, preservation of, 269.
Towers, Mr, on the rotation of crops, and abstract of that followed on Stinchcombe farm, 519.
Tull, Jethro, and his husbandry, 342.
Turnips, a peculiar mode of raising them, 247.
Turnpike, an important decision thereon, 124.

Vegetation, on the use of gaseous substances to, 32.

Walker, Mr, on the rotation of cropping suitable for the north-east of Scotland, 413.
Water, supply of it for London, 122.
Wheat, destructive effect on sheep when new, 127—table of the prices of, in Scotland for eight years, from 1832 to 1840 inclusive, 264—sowing kiln-dried, 270—table of the prices of the various kinds in the Edinburgh market, from 1st Jan. to 31st Dec. 1840, 616.
Wigtonshire, fiars' prices of, for crop and year 1839, 140.
Wood, on preserving it, 117.
Wooden under-drains, 126.
Wool, prices of the various kinds of English and Scotch, 138, 276, 440, 616.
Woollen and glass cloths, 125.
Working classes, on improving their condition, 541.

END OF VOLUME XI.

PRINTED BY NEILL & CO., OLD FISHMARKET, EDINBURGH.

THE LIBRARY OF CONGRESS

THE LIBRARY OF CONGRESS

LIBRARY OF CONGRESS
00026913548